United States
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Forest Service

Tongass
National Forest

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April 1996

King George Timber Sale

Draft Environmental Impact Statement

Stikine Area

United States Department of Agriculture | Forest Service | Region 10 Tongass National Forest | Stikine Area
P.O. Box 309
Petersburg, Alaska 99833
(907-772-3841)

File Code: 1950

Date: April 4, 1996

Dear Reviewer:

We have enclosed a copy of the Draft Environmental Impact Statement for the King George Timber Sale on Etolin Island, Stikine Area of the Tongass National Forest. This document describes one no-action alternative and five action alternatives ranging from 26.6 to 14.1 million board feet of timber harvest. The preferred alternative is Alternative 5, which includes 26.6 million board feet of timber, to be harvested from 1,357 acres in 27 units. Harvest methods include clearcuts with reserve trees, patch cuts, group selection, overstory removal and individual tree selection. Road construction would include 12.7 miles of specified and temporary road.

The comment period on the Draft EIS will be at least 45 days from the date on which notice of availability of the Draft EIS is published in the Federal Register, anticipated to be April 26, 1996. The deadline for comments is anticipated to be June 10, 1996. The Final EIS is scheduled to be finished in August 1996.

Federal court decisions have established that reviewers of Draft EISs must structure their participation so that it is meaningful and alerts an agency to the reviewer's position and contentions. Environmental objections that could have been raised at the Draft stage may be waived if not raised until after completion of the Final EIS. This is so substantive comments and objections are made available to the Forest Service at a time when it can meaningfully consider them and respond to them in the Final EIS.

The responsible official for the decision is Abigail R. Kimbell, Forest Supervisor of the Stikine Area, Tongass National Forest, Alaska Region.

Please send written comments to Meg Mitchell, P.O. Box 51, Wrangell, AK, 99929, or call (907)874-2323 for additional information, or if you would like additional copies of the Draft EIS.

Sincerely,

Abigail R. Kimbell

ABIGAIL R. KIMBELL
Forest Supervisor

Enclosure

King George
Timber Sale

Draft Environmental Impact Statement

USDA Forest Service
Alaska Region
Alaska

Lead Agency:	Alaska Region USDA Forest Service Stikine Area Tongass National Forest P.O. Box 309 Petersburg, AK 99929
Responsible Official:	Abigail R. Kimbell Forest Supervisor, Stikine Area Tongass National Forest Alaska Region
For Further Information Contact:	Meg Mitchell, Team Leader Wrangell Ranger District Tongass National Forest P.O. Box 51 Wrangell, AK 99929 (907) 874-2323
Reviewer Comments Must Be Received By:	June 10, 1996

Abstract: This Draft Environmental Impact Statement describes the effects of five "action" alternative approaches, and one "no action" approach to harvesting timber in the King George Study Area.

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Summary

Summary

If you have limited time to review this document, this summary and Chapters 1 and 2 will give you a good overview of this project, and the environmental effects. We kept these sections concise to facilitate your review.

Chapters 1 and 2 give a good overview.

Chapter 1 discusses the reason we are considering harvesting timber in the King George Study Area and is a good place to look if you want a summary of our response to public comments. One of the most important functions of public comment is to help us identify the key planning issues for the project. The public comments we received showed that there were four main issues that people really cared about. We outline these four issues, and how we plan to measure the alternatives against them, starting on page 1-6:

- **Scenic and Recreation Resources**
- **Timber Sale Economics & Road Management**
- **Freshwater Systems and Estuaries**
- **Wildlife Habitat Conservation**

Chapter 2 discusses the different alternatives we designed, based on the public comment we received. The **Proposed Action** (Alternative 5 in this document), proposes the highest level of harvest that could occur in the King George Study Area. It is described in detail, starting on page 2-1. **Alternative 1** (page 2-4) responds primarily to public concerns about freshwater systems, and habitat conservation. It is also the only alternative that fully relies on helicopter yarding of the timber from harvest units. **Alternative 2** (page 2-6) responds to scenery concerns by focusing harvest in the interior and northern part of the study area. It is also the only alternative that proposes a road on the south side of Honeymoon Creek. **Alternative 3** (page 2-8) emphasizes scenery and freshwater systems concerns by proposing very light cutting on Zimovia Face, and avoiding the Lower King George area. **Alternative 4** (page 2-10) responds to concerns over economic return, freshwater systems, and habitat conservation by avoiding the entire King George watershed. This alternative also proposes the least amount of road of all the alternatives that propose roads. The **No Action Alternative** (Alternative 6 in this document) proposes no change to the existing environment in the King George Study Area. A chart located at the end of this summary reviews the major effects and features of each alternative.

Alternative 5 is preferred, with some possible adjustments.

The **Preferred Alternative** is described at the end of Chapter 2. We've selected Alternative 5, the proposed action, as our preferred alternative. We would like your comments on possibly:

- Harvesting units 3, 4, 30 and part of unit 5 on the Zimovia Face with helicopter partial cuts. The road would be constructed only to Unit 5. This would address many of the scenic quality concerns of Zimovia Highway residents.

- Administratively deferring harvest of harvest units 6, 10, 11 and 12 as future small sales and changing the harvest prescriptions for units 10-12 to include a combination of individual tree selection and patch cuts (1-5 acres). This lower honeymoon area could be managed for high quality wood fiber (large trees with pruning and thinning) and riparian values over time.

- Administratively offering small sales with harvest units 15, 20, 23 and 24 before the road is closed at the King George Creek bridge. We would maintain the Honeymoon road system to the bridge over time.

Chapter 3 describes the effects.

Chapter 3 discusses the existing conditions in the King George Study Area, and provides analysis showing how harvesting timber in this area will change these conditions. The main analysis in this chapter examines how the six alternatives differ, with respect to the key planning issues described in Chapter 1.

Extra alternative maps are at the back of Appendix B.

The **Appendix** describe key findings of the Etolin Island landscape analysis and King George desired conditions we want to maintain over time **(Appendix A),** the Unit and Road cards which show specific boundaries, mitigation measures and harvest methods **(Appendix B),** the Monitoring and Improvement projects **(Appendix C),** information about the LTF **(Appendix D)** and a comparison of actions with the proposed Anadromous Fish Habitat Assessment Report recommendations **(Appendix E).**

Extra alternative maps are located at the end of Appendix B so that you can remove them and refer to them as you review the document.

Table S-1, Alternative Comparison Table

		Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
Scenery Values	Visible Acres Harvested in Zimovia Strait Viewshed	258 (9%)	67 (2%)	157 (5%)	259 (9%)	238 (8%)	0
	Visible Acres Harvested in Chichagof Pass Viewshed	131 (5%)	131 (5%)	131 (5%)	131 (5%)	131 (5%)	0
	Visible Acres Harvested in Stikine Strait Viewshed	175 (3%)	235 (4%)	65 (1%)	155 (2%)	374 (6%)	0
	Visible Acres Harvested in Bessie Peak Viewshed	95 (2%)	438 (7%)	385 (6%)	208 (4%)	533 (9%)	0
Economics	Volume	14,060 MBF	19,500 MBF	16,700 MBF	16,170 MBF	26,640 MBF	0
	Percent of Manageable Acres Treated	14%	15%	14%	15%	22%	0%
	Miles of Road Construction	0	10.8	7.7	5.3	12.7	0.0
	Miles of Road Open to Motorized Vehicles (after harvest)	0	4.0	4.4	3.8	0	0
	Net Stumpage	$23/MBF	-$3/MBF	$12/MBF	$11/MBF	$16/MBF	0
Freshwater System	Critical Stream Crossings	0	14	9	3	11	0
	Acres Harvested in Freshwater System	260	560	480	350	790	0
	Miles of Road in Freshwater System	0	9.8	6.7	3.3	9.7	0
	Wetland Acres Harvested	116	138	157	146	202	0
	Wetland Acres Roaded	0	22	9	4	17	0
	Acres Harvested on Mod to High Hazard soils	205	348	280	255	379	0
	# Feet of Road Construction on Moderate to High Hazard Soils	0	2,812	0	0	5,679	0

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
Habitat Capability as a % of Current Condition for: Deer Marten Black Bear Red Squirrel Hairy Woodpecker Brown Creeper	97% 95% 99% 96% 91% 97%	94% 94% 99% 95% 88% 90%	96% 95% 96% 96% 90% 95%	96%	92%	100%
Marten	95%	94%	95%	95%	90%	100%
Black Bear	99%	99%	96%	96%	96%	100%
Red Squirrel	96%	95%	96%	96%	92%	100%
Hairy Woodpecker	91%	88%	90%	90%	84%	100%
Brown Creeper	97%	90%	95%	96%	86%	100%
Travel Corridor Maintained to: Chichagof Face	Yes	Yes	Yes	Yes	Yes	Yes
Honeymoon	Yes	No	No	No	No	Yes
Red Mountain	Partial	Partial	Yes	Partial	Partial	Yes
Kunk Lake	Yes	Partial	Partial	Yes	Partial	Yes
Fishtrap Drainage	Partial	Partial	Yes	Yes	Partial	Yes
Acres in Patches Larger Than: 5,000 Acres	0	0	0	0	0	5,890
1,000 Acres	8,350	7,660	8,220	8,220	7,230	10,140
500 Acres	8,350	8,590	9,065	8,220	7,845	10,140
180 Acres	9,050	9,000	9,335	9,055	8,950	10,550
Weighted Mean Old Growth Block Size	1,960	1,350	3,120	1,860	1,155	5,390

Chapter 1

Purpose and Need for Action

Chapter 1

Purpose and Need for Action

Introduction: This Document and You

Thank you for your interest in the proposed King George Timber Sale. This Draft Environmental Impact Statement (DEIS) documents our efforts to (1) make decisions about a possible timber sale within the King George Study Area based upon laws and other direction and upon public needs and concerns, and (2) to continue to keep you informed and involved by providing you another opportunity to comment. After public review of this document, a Final Environmental Impact Statement will be published and the Forest Supervisor of the Stikine Area, Tongass National Forest, will make a final decision.

In this DEIS we describe a "Proposed Action" and five other alternative approaches to harvesting timber, building and maintaining roads and constructing a log transfer site within the area on Etolin Island known as the King George Study Area. We have also disclosed the environmental effects and resource outputs that we expect from the Proposed Action and each of the alternatives. You have the opportunity to comment on this document within 45 days from the date of publication. The more specific you are about your suggestions and concerns, the better able we will be to respond. Possible areas for comment include:

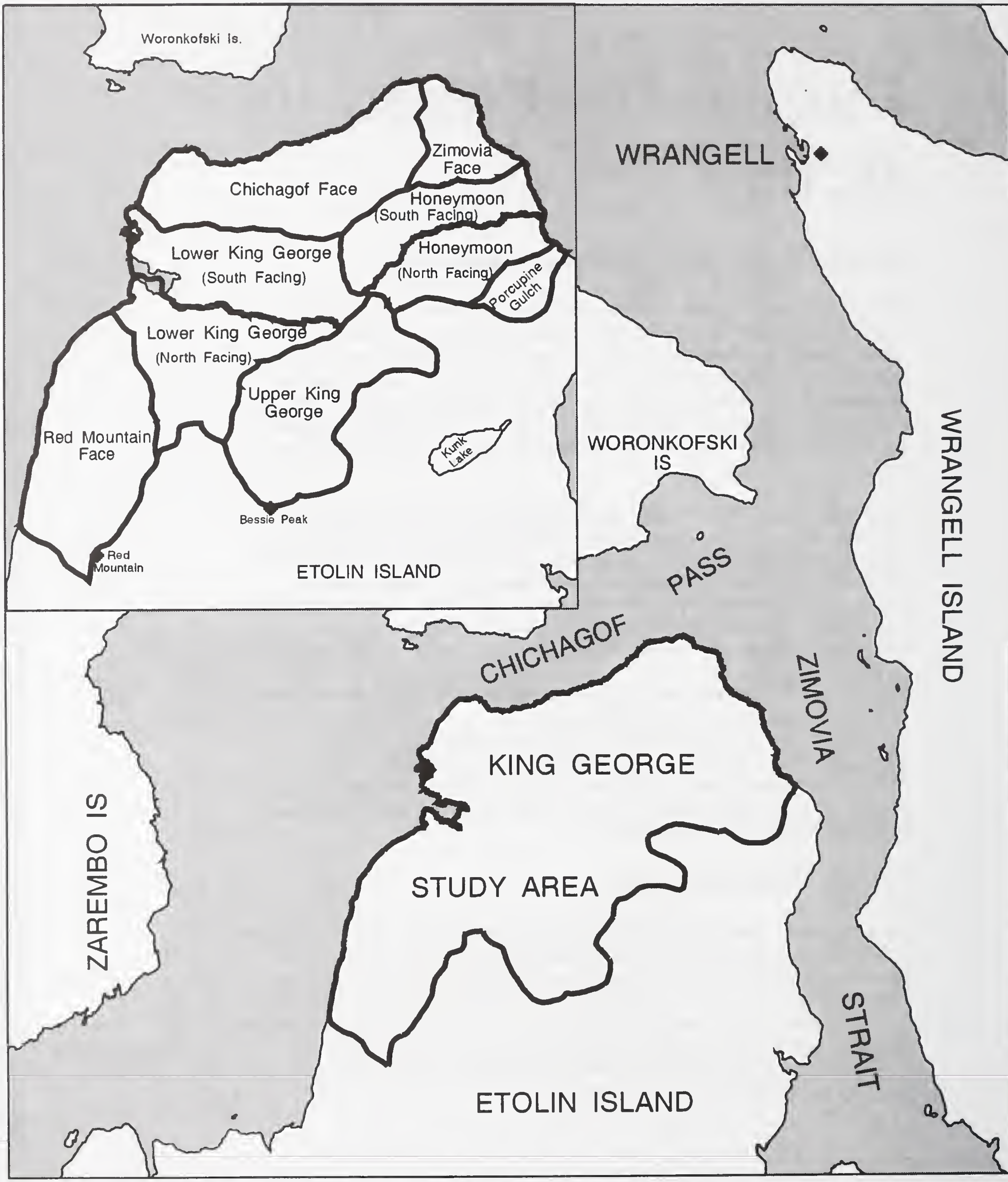
1. What you do or don't like about the alternatives or specific aspects (units, roads, etc. about certain alternatives).
2. Areas we can better explain or disclose possible environmental concerns.
3. Your thoughts concerning road management after the sale.

If you do choose to comment, we will respond to you by letter. Both your letter and our response will be published within the Final Environmental Impact Statement along with any changes in the project and document.

Project Area Location

The King George Timber Sale Study Area is located on the northern end of Etolin Island in Southeastern Alaska about 10 miles south-southwest of the town of Wrangell (See Figure 1-1). Much of the 16,300 acre study area is drained by King George Creek into King George Bay to the west and by Honeymoon Creek which empties into Zimovia Strait to the east. To help better plan and show the effects of harvest in the study area, we divided it up into smaller watersheds known as land-units. These areas include the Chichagof face, Zimovia face, Honeymoon Creek, Porcupine Gulch, Upper and Lower King George, and Red Mountain face land units.

Figure 1-1, Project Area Map



Overall Direction for the Project

Tongass Land Management Plan- The Tongass Land Management Plan (TLMP or Forest Plan) provides broad management direction for the lands and resources in the Tongass National Forest in Southeast Alaska. Forest goals, anticipated outputs, management area emphasis descriptions, and schedules of proposed management activities are included in the Forest Plan. The Forest Plan designates one of four Land Use Designations (LUD's) to land areas: LUD I (Wilderness Areas), LUD II (Roadless Areas), LUD III (areas that emphasize balancing both amenity and commercial uses), and 4) LUD IV (areas that emphasize intensive resource development).

The Forest Plan emphasizes timber harvest that is compatible with amenity uses.

Land Use Designations- The study area includes all of Value Comparison Unit (VCU) 462. In the Forest plan, this VCU is allocated to a Land Use Designation (LUD) of III. We are to manage LUD III lands for a variety of commodity and amenity uses. The emphasis is on managing for uses and activities in a compatible and complimentary manner to provide the greatest combination of both commodity and amenity benefits. These areas have either high use or high amenity values in conjunction with high commodity values.

Management Area Direction/Emphasis- The Forest Plan further allocates VCU 462 to the North Etolin Management Area (S23) and states: *"Management in this area (North Etolin) will emphasize the development of an interconnected road system for timber management and other resource uses if economically and environmentally feasible. However, the geography will require development of some separate systems...Recreation opportunities/potential will be protected at Steamer Bay, Three-way Passage, Rocky Bay, Mosman and Burnett Inlet... Wildlife habitat improvement should be developed along with timber sale activities wherever practical. Major visual quality objectives will range from partial retention to maximum modification with the higher quality objectives in the areas seen from the Clarence and Stikine Straits ferry route and Zimovia Strait small boat route. The Retention Visual Quality Objective* (activities will not be noticed) *will normally apply to the immediate vicinity of specific recreation features."* The Forest Plan also specifies the method we use to set aside or manage key areas of essential habitat for wildlife and fish species (primarily old-growth forest) within areas that would otherwise meet timber scheduling criteria.

Revision of the Tongass Land Management Plan- The Forest Plan is presently being revised in order to better reflect the public's needs on the Tongass. This new Forest Plan will give direction to the project area. Presently, the Supplement to the Draft Environmental Impact Statement for the Revision has alternatives that allocate the project area to a spectrum of possible land uses including Scenic Viewshed, Modified Landscape, and Timber Production prescriptions. In Alternative P of the 1991 Draft Revision, the area is allocated to a combination of Scenic Viewshed (along Stikine Strait, Chichagof Pass and Zimovia waterways) and Modified Landscape (in the center valleys of King George and Honeymoon creeks) which acknowledges the visibility and scenic importance of the King George Study area. Other important guidelines proposed by the plan include the implementation of stream, beach and estuary buffers. The projects and activities proposed and analyzed in this DEIS are consistent with the current Forest Plan. To the extent practical, we have also aimed for consistency with the guidelines currently being studied in the Revision.

Desired Future Condition

The desired condition for the planning area is summarized in Appendix A.

After examining the intent and direction in the Forest Plan, we studied the potential of the study area to provide for timber harvest, balance amenity and commodity interests while maintaining important ecological functions. This analysis helped us refine the purpose and need for the project and develop the Proposed Action and other alternatives. Specifically our analysis helped us identify that 900 to 1300 acres could be harvested for timber using a variety of cutting methods to maintain important wildlife habitat, freshwater and riparian system functions and recreation and scenic values. This analysis also helped us understand how possible actions in the King George Study area affect or are "linked" to the rest of the North Etolin Island landscape. This aspect of the analysis helped us formulate a strategy for designating key habitat areas as required by the current Forest Plan. Appendix A summarizes this "desired condition," that all alternatives are designed to achieve.

Purpose and Need

The purpose and need for this proposal is to make available for harvest approximately 15 to 25 million board feet (MMBF) of timber to (1) carry out direction in the Tongass Land Management Plan, (2) contribute to providing a sustained volume of wood to meet local and national demands and (3) provide local and regional employment opportunities. A comparison of the existing and desired conditions suggests that approximately 900 to 1,300 acres could be harvested with a variety of silvicultural methods. These silvicultural methods will be designed to maintain stand structure and ecological functions over time while still yielding timber. These methods will leave low, medium and high densities of trees within the stands following harvest. Harvesting between 900 to 1300 acres of forest using these methods could yield between 15 to 25 MMBF of timber. A variety of resources and values will be maintained through the application of ecosystem management principles in the design of the project.

Proposed Action

What Is Meant by the "Proposed Action"- At the start of our project planning process we define a "proposed action" so that the public and other agencies can know more about the project. The "proposed action" identified at the start of a project, does not necessarily end up being the "preferred" or final "selected" alternative. For this project, we chose to put forth the alternative with the most potential development (harvesting 1300 acres identified in the desired condition analysis and develop a full road system) as the proposed action so that the public could comment more fully on all the possible management actions we envision at this time. We then develop other alternatives to the proposed action in response to environmental issues, public concerns and comments from other agencies.

The proposed action is Alternative 5. In this project, it is also the preferred alternative.

The Proposed Action (Alternative 5) for this project is to harvest approximately 26.6 MMBF of timber from 1,357 acres. Harvest methods would leave various amounts of trees within units. A variety of log yarding systems would be used including helicopter, cable, skyline and shovel systems. About 12.7 miles of road would be constructed in the Honeymoon and King George Creek valleys. A log transfer site, with a low-angle ramp, would also be constructed just north of Honeymoon Creek. You can find a more detailed description of the Proposed Action and alternatives to the Proposed Action in Chapter 2.

Decision to be Made

The Stikine Area Forest Supervisor will decide; 1) if, where, how and how much harvest will occur in the King George area, 2) how much and where road construction will occur to facilitate harvest and how roads should be managed, 3) where to retain old growth habitat, and 4) what mitigation measures and monitoring will be implemented.

The Planning Method and Public Involvement

(Comments from King George public scoping appear throughout this document in *italics*.)

"Many of us feel major decisions are made, and then---as a matter of fulfilling a requirement "public comment" is asked for. This is frustrating and tempts one not to even bother to respond. If you can come up with an alternative in the draft EIS which is not a deficit sale, provides jobs for Alaskans, cuts timber selectively and sells it at a profit to a U.S. craftsman who will prepare and use it to build wood products of beauty and quality, respects the integrity of the land and water and leaves it unharmed in any way, and gets the support of (environmental groups), then you'll have my support too. Good luck."

When a timber sale project begins, we designate a group of professionals with a variety of educational backgrounds to a team known as an "interdisciplinary team" or IDT. It is the job of this team to listen to public comment, and work with you and the various State and Federal agencies to plan the best possible project. This team conducts the planning process, writes this document and informs you and the Forest Supervisor of the environmental consequences of the alternatives.

People told us they were frustrated by public involvement.

We listen to the frustrations many of you have interacting with us. A common complaint is that we have made up our minds to harvest timber in the King George project area. It's true we have a pretty good idea we want to harvest timber there. If we were not serious in our intent to design the best sale possible, we would not waste your time or the taxpayer's dollars going this far with the analysis. The "no action" alternative is a viable alternative, but it is not our proposal. We do take the "no action" alternative seriously because by law it serves a very important role in helping all of us examine the effects of doing something different. The decision to manage an area for timber is made in the Forest Plan. How and when to manage timber resources in the King George study area is the decision being made by this document. Public comment is very effective in determining the conditions and extent of potential harvest, particularly in the early stages of this project. For example, we have been responsive to public comments (such as the one above) by:

- Determining how the activities proposed in this harvest entry will fit into the entire landscape of North Etolin Island, by conducting a landscape analysis prior to planning this sale
- Using harvest methods, other than clearcut, on the majority of acres treated in each alternative
- Addressing habitat conservation and fishery issues by reducing activities in the King George watershed
- Designing a range of alternatives which are both economical, and responsive to environmental issues

In this section, we show you how we responded to public comment.

In the section that follows and in the rest of this document we will try and show you exactly how we incorporated public comments into all or at least one alternative. It is difficult to show people we are listening, when comments vary so widely, and almost no

two people agree. Therefore we often present a range of alternatives that reflects the range of public opinion.

"Public Scoping" is the term we use to describe the process of finding the significant issues for a project by contacting interested individuals and agencies to determine their concerns. The following is a summary of the letters, contacts and meetings which took place during the planning of this project:

- November, 1993 - Initial "Scoping Letter" and Newspaper Announcements
- September, 1994 - Petersburg and Wrangell, 4 day Open House
- June, 1995 - "Analysis Update" mailer describing Issues and Alternatives
- Proposed Action Published in the Federal Register
- Various meetings with individuals, agencies and organizations including: The Corps of Engineers, Alaska Department of Fish and Game (ADF&G), Alaska Department of Environmental Conservation (ADEC), The Wrangell Resource Council, Wrangell Chamber of Commerce and the Cultural Heritage Committee (IRA).

Several State and federal agencies are involved.

The Importance of Other Agencies- The Forest Service is responsible for coordinating the review of the project by several other agencies. The purpose of these reviews is often to seek their professional point of view on topics in which they have expertise. In some cases, the reviews are necessary because another agency has authority to issues permits for a specific activity we propose. Below, we have described our relationship to other agencies in the planning of this document.

US Army Corps of Engineers- The Corps is responsible for approving actions which propose to dredge or fill materials into the coastal waters of the United States under Section 404 of the Clean Water Act. In this project, we seek a permit from the Corps for the log transfer facility north of Honeymoon Creek. The Corps also has administrative authority over activities associated with wetlands. There are many types of forested and unforested wetlands in the project area including peatlands known as "muskegs." Any harvest or road construction in these areas is of interest to the Corps, and we must illustrate we have considered and reduced our effects on these areas.

Environmental Protection Agency- The EPA provides a general review in accordance with their responsibilities under the National Environmental Policy Act and Section 309 of the Clean Air Act. The EPA is also a reviewer under Section 402 of the Clean Water Act.

US Fish and Wildlife Service- This agency has authority over threatened and endangered species since they administer the Threatened and Endangered Species Act. Our biologists consult with the service to determine if we are affecting these species. We also discuss effects on other wildlife species with them since they also have expertise in this area. In addition, the Fish and Wildlife Service has collected information on our potential log transfer site and we consult with them during the permit process.

National Marine Fishery Service- Has authority for threatened or endangered marine life and we consult with them on possible effects to these species as well as others. We also consult with them on the log transfer site permit.

State of Alaska- Five departments in the State of Alaska are asked for their participation in the planning of this project. They supply general comments and suggestions and also specific reviews such as: 1) **Department of Natural Resources-** Tideland Permit and lease of easement necessary for the log transfer site, 2) **Department of Environmental**

Conservation- Participates in cooperative water quality management through Section 319 of the Clean Water Act and a Memorandum of Agreement with the Forest Service. ADEC also issues a certificate of compliance with Alaska Water Quality Standards under Section 401 of the Clean Water Act, 3) **Department of Fish and Game-** Are heavily involved in the Coastal Zone Consistency review and take a special interest in fish, water, wildlife and subsistence issues, 4) **Department of Governmental Coordination-** Provides overall coordination for the State's comments and administers the Alaska Coastal Management Program (ACMP) which requires the Forest Service to design their activities to be compatible with approved State management guidelines, 5) **State Historic Preservation Office-** Compliance with Section 106 of the National Historic Preservation Act, a process to determine the effects of alternatives on cultural resources.

Key Issues

There are four key issues:
- ***Scenery & Recreation***
- ***Economics & Roads***
- ***Freshwater Systems***
- ***Wildlife Habitat***

Although there are often many issues surrounding the planning of any timber sale, the law directs us to analyze in detail only those issues which are significant. This helps ensure that this document is concise and focuses on the key issues that those reading it care about. For this project we used an "Initial Scoping" letter to ask individuals and agencies their broad concerns, then after we studied the responses and conducted some analysis, we sent out a second "Project Update" letter to verify the key issues and get some feedback on draft alternatives.

As a result of the contacts we made with you, we felt there were **four key issues** of concern; 1) impacts to scenery and recreation opportunities, 2) timber sale economics and road management, 3) impacts to freshwater systems and estuaries and 4) effects on species and habitat conservation. Within each of these issues, there were a wide range of opinions voiced by the public.

For each Key Issue that follows we've included excerpts from actual letters received from you, other concerned citizens, groups and agencies. In the interest of space, we have not included all the comments we received. Instead we wanted to give you some idea of the range of comments we got, representing the many perspectives on a single issue.

Issue One - Scenic and Recreational Values

"The viewshed of this study area is seen by virtually all people traveling the inside passage near Wrangell. This includes all the cruise ships and Alaska State ferries which travel along Stikine Strait and Chichagof Pass as well as marine travelers using Zimovia Strait traveling to and from Wrangell."

"King George and Honeymoon Cove are very popular recreation sites for local residents and visitors. Beautiful Scenery, nice beaches, proxim(ity) to town, and good hunting and fishing are common to both areas, and King George is the favored take-off point for climbers heading up Mt. Bessie."

"We consider the King George area very scenic and spend time there often. The waters near the shore are also among our favorite fishing spots. While we could accept some cuts in this area, logging it all would create an eyesore out of a beautiful place. We believe the scope of logging planned is excessive and does not balance well against the recreational use of the area."

"Everywhere you see previous clearcuts, the new growth is far healthier and, thus more beautiful."

"Please spare us, our children, our neighbors and all visitors to this beautiful areas and log somewhere out of sight of residential areas. I don't think there is a person on this earth who would like to have a logging site take the place of their wilderness, waterfront views."

"We can see the King George project area from our living room window and to see logging happening there won't hurt our feelings. We note that the southeast corner of Woronkofski was logged some years ago and that it's all grown back quite nicely. Looks good from here."

"A very high proportion of the suitable commercial forest land is highly visible from the south end of the City of Wrangell and all along Chichagof Pass and the ferry route on Stikine Strait. Log- transfer sites are typically characterized by sometimes massive, road-cut scars such as at Pat's Creek landing or Olive Cove."

"Please log as much as possible - it will provide new, good timber for my grandchildren who will definitely need the work and the wood for homes. Please build as much road as you can so that I will have access to the scenery and wildlife in my declining years. Only lock up the part you think will support you and your family with work."

"My family and many others residing in Wrangell are here because of the blessing of safe harbors & the distinct beauty of the close, surrounding mountainsides. This is one of the main reasons we decided on Wrangell as our home. And because the Forest Service has the ability to select (harvest) areas subject to less negative community impact, I feel the King George area would do better to be maintained as it currently is."

"It does not bother us how much timber they cut. After 15 years the new growth is up and looks a lot better than the old-growth."

"I don't understand why we can't have one...island near Wrangell that is left alone! Why can't you pick on other islands or on the mainland, away from where we have to look at it all the time? I know the scenic considerations don't mean anything to you or the loggers, but they do to us!"

"I am in favor of allowing the maximum of logging in the King George area. The roads proposed would open more land for public recreation and the ability for the average family to access this area in terms of hunting, hiking, and just general recreation."

What We Heard... "Beauty is in the eye of the beholder." Whether or not you see the new growth created by harvest as beautiful, most people acknowledge that traditional clearcutting is controversial and ugly, at least for a few years. Thus, partial cutting appeals to some people as one way to have some harvest without the severe visual effects of clearcutting. People care about the views from Stikine Strait, Zimovia Strait and Chichagof Pass because these waterways are common recreational boating lanes for both locals and tourists and the ferries also use these waters. Although not all residents along Zimovia Highway agree, there is concern about the view they will see from their homes. There are also some recreation places that people care about, like views and access to Bessie Peak and dispersed recreation sites near the mouth of Honeymoon and King George Creeks. Although these are the three main recreation sites currently in the project area, if we were to harvest, the development of roads would change the available recreation opportunities. Som

because it brings in more people. People have mixed views about keeping roads open to motorized traffic.

Our Response to What We Heard About Scenery and Recreation Issues...

1) We do not propose clearcutting as the dominant method of harvest. Depending on the alternative, clearcutting accounts for 0% to 27% of the acres harvested. Although some alternatives will have more visual impacts than others, all alternatives designed units to be as unobtrusive and natural looking as possible.

Scenery issues are dealt with by:

- *avoiding harvest in a viewshed, and*
- *using partial cuts*

2) We designed the log transfer site to be unobtrusive by having only the minimum facilities necessary on the beach. Cutting into the bank was minimized and a low angle ramp is proposed because it is more flexible to a variety of operators and is less visually obtrusive. The log transfer site is about 1/3 the size of Pat's or Earl West Cove LTF's by comparison.

3) There is no harvest immediately adjacent to the mouth of King George Creek or Honeymoon Creek. We propose that the bulk of old-growth reserve areas be placed in the King George Creek area because it will do wildlife and people the most good there. Thus, there is little if any effect to the King George recreation place in any of the alternatives.

4) We provided a range of management options for roads which varies from keeping them open to both motorized and non-motorized travel OR to maintain some of them as trails for walk-in or bike in access. We are interested in more comment on road issues.

5) Our proposals protect the ability of hikers to use the ridge line corridor to access Bessie Peak with minimal harvest and tried to design any units in the interior of the valleys to blend into terrain features or appear like some of the existing slides.

In addition, we designed each of the alternatives to respond to the possible impacts on scenery and recreation in different ways. To help you see the key differences between the alternatives we will:

- Include drawings of the King George area the way it would likely appear from the Zimovia and Stikine Strait waterways.

- Show the acres of different harvest prescriptions used that will be seen from each vantage point and discuss the potential success and impact of these methods to reduce visual impacts.

- Describe the impacts of the proposed log transfer site by using other sites in the area (Pat Creek and Earl West Cove) as a basis of comparison.

- Describe any shifts in recreational opportunities or experiences that will occur in the project area due to harvest and road construction and management. We will describe how these changes may affect certain user groups negatively or positively.

Issue Two - Timber Sale Economics and Road Management

"My first concern deals with providing an economical timber harvest. In order to do this units must have adequate volumes of good timber and sound logging costs. Helicopter logging should be used sparingly and only when absolutely necessary."

"30 MMBF seems like an extremely high volume sale for an area this small and hilly."

"I do not buy into the local jobs point of view especially when the local saw mill and pulp mill are not locally owned."

"Opportunity should be explored to reduce road standards when possible. Alternatives should explore road building activities which will reduce costs, meet use objectives and protect resources."

"Over the last 24 hours I have watched three tugs tow log rafts south out of Anita Bay past Thoms Place toward Clarence Strait and Ketchikan. Not even the tugs were Wrangell-based. ...there is no reason to suspect that...the <u>real</u> economic gains to be made from harvesting timber in this area just a few miles from Wrangell will be lost to this community. This sale should <u>not</u> be characterized as being of economic benefit to Wrangell when the likelihood is that it will be left with 1,200 acres of harvested forest on its front doorstep and very little else to show for it.

"Also, if there is a sale, that it is small enough and laid out such that small logging operators can bid on it and it's not another gravy ride for Ketchikan Pulp."

"Considering the shortage of economically-harvestable wood available to the timber industry, the plan should include one alternative that is the maximum-allowable cut legally permissible. Other alternatives should heavily consider economics and produce timber sales that make economic sense."

"We're not too crazy about helicopter logging. They seem to hire more out of State help and we would like to see Alaska jobs go to Alaskans. We don't see any Alaska-based helicopter companies."

"I think it would be OK to leave the roads open after logging as they will never be tied to any mainline systems."

What We Heard... The harvest, transportation, and production of timber have been important components of the economies in Southeastern Alaska for decades. Long-term contracts between the U.S. Government and timber industries stimulated these economies by sustaining certain levels of timber harvest each year. In recent years, one of these contracts was canceled and some towns are experiencing declines in timber-related revenues. Our public scoping identified significant concerns about the availability of timber–both for large and small operators–in the future and about the rising costs associated with logging. Some frankly don't see the local benefit of harvesting timber, now that the mill has shut down. Also of concern to some is whether the timber from this sale would be offered to long-term contract purchasers or to independent purchasers. There are many factors that drive up the cost of harvesting timber in Southeast Alaska; road building (often on soft muskeg soils), quality of the timber cut and yarding method (helicopter is the most expensive, cable is the least).

Our Response to What We Heard About Economic and Supply Issues...

1) In each alternative we tried to reduce the costs while still exploring the possible environmental advantages. All but one alternative is "in the black" according to our mid-market assessment. Temporary roads are used in areas where the road will not be needed in the future.

All alternatives are as cost effective as possible.

2) We have used harvest methods other than clearcutting to balance the increased cost of helicopter yarding and increase economic revenues when possible. This is achievable when the trees left for wildlife or scenic resource reasons are not the same trees that are best for timber or the most economical to harvest. We also propose to leave good quality seed trees and younger trees in harvest units to help regenerate a healthy mix of trees.

A mix of small and large sales is considered.

3) Each alternative has some units that can be easily logged by both small and large operators. This affords us the flexibility to offer one or several sales from this environmental document. Even though the decision to harvest timber is being made under this document, it will not address who specifically gets the timber (only the environmental effects). We have heard your concerns and will disclose the amount of volume and units that have the **potential** to be offered to small operators.

A variety of road management options are provided.

4) The log transfer site design was kept as small and as cost effective as possible. We propose a ramp, instead of a bulkhead so that it can be used by a variety of small and larger operators.

5) We provided a range of management options for future road management to reduce maintenance costs. Again, we are interested in hearing more about your views on roads.

The alternatives vary widely in their effect on economics and supply issues. In order to understand the effects of each alternative, we will:

- Explain the regional and local economic benefits of the sale and each alternative.
- Estimate the volume to be harvested by alternative.
- Display harvest costs and selling values for each alternative.
- Identify the harvest units, acreage and volume of those areas that have the potential to be harvested by small operators because they are close to a road or would not require special equipment.
- Show the relative costs and benefits associated with keeping open portions of any road system constructed.

Issue Three - Freshwater Systems and Estuaries

"I am also worried about the effects logging may have on fishing in the area especially the King George drainage. As it stands this is one of Wrangell's most productive areas for sport fishing."

"We are concerned that a sale of this size in two small watersheds will have serious impacts on fish...populations."

"The material along Honeymoon Creek should be left for 200 feet, as salmon and trout are in this creek...I haven't been around to King George Creek in over 30 years, but I would assume fish are in that creek also, and should be protected, too."

"All culverts and bridges should be removed at the end of the sale and all roads grass seeded. Harvest as many units as possible with helicopters to reduce the need for roads, particularly in the steeper slopes of King George."

"I am a commercial crab operator. Honeymoon Creek has very good crab habitat. I'm afraid that the location of your LTF would put this in jeopardy."

"Wetland mapping will need to be included with the DEIS to support wetland avoidance/minimization requirements. There will need to be a discussion on how road construction will be designed to meet Best Management Practices (BMP's)."

"In addition to assuring full protection of fish habitat when designing stream buffers, the Forest Service needs to avoid, to the maximum extent practicable, the highest value wildlife habitat in the 100-300 foot riparian zone."

"Much of the area appears to be steep. An issue would be whether harvest occurs on high hazard soils or over-steepened slopes. Timber on slopes of over 75% should not be harvested and should not be included in the timber base."

What We Heard... This issue centers on concerns about how timber harvest, road construction and log transfer site activities will affect the quality of the freshwater systems and the fish and wildlife that use them in the area. Freshwater systems include anadromous and resident fish streams and their tributaries, their riparian areas, floodplains, wetlands, and estuaries. Commercial and sport fishermen, in particular, care about keeping fishing streams healthy and productive. Roads and timber harvest produce sediment which may threaten this productivity. Other agencies such as the Corps of Engineers, the Environmental Protection Agency and the State of Alaska have particular interest in this issue since they have authority of the management in and around streams, tidelands, estuaries and wetlands. They often have very specific information needs relative to each proposed unit, road and alternative.

Our Response to What We Heard About Freshwater and Estuary Issues...

Inventories identified all fish streams near disturbance areas to protect them with at least 100 foot buffers.

1) We completed extensive inventory of streams and field verified all potential areas of disturbance. Streams in the project area were surveyed and flagged to verify and mark the extent of fish habitat. Unit and road cards show most of the streams we are likely to affect. The FEIS will include further inventory updates.

2) The Tongass Timber Reform Act 100 foot minimum buffers have been identified in the field and are key to helping protect fish habitat values in the project area. In many cases the buffers exceed 100 feet to provide logical unit boundaries. We located roads as far away from streams as practical while still meeting timber access objectives.

3) Estuary and beach buffers protect important estuaries where freshwater meets saltwater in all alternatives. Logical field verified unit boundaries and road locations resulted in buffers which meet or exceed Forest Plan guidelines.

4) Most of the old growth habitat retention is located in the King George drainage, thus helping protect the highest quality anadromous fish habitat in the study area. The proposed log transfer site was located on the Honeymoon Creek side. We rejected several

potential locations on the King George side because the LTF's and associated roads would have more environmental impact to marine life, fish and wildlife. The LTF and sort yard design minimize bare ground and reduce the potential for sediment transport to fresh and marine waters.

5) We avoided wetland impacts where practicable while still providing access to timber. Proposed harvest and roads incorporate site-specific measures to maintain wetland soil/water/vegetation functions. These are described in unit and road cards in the appendix.

Wetland and estuary functions are maintained.

6) We considered road maintenance concerns when we explored various road management options. Some roads involve greater risks to water quality and this became an important criteria for managing roads in both open and closed conditions.

7) Proposed harvest is minimized on over-steepened slopes having a high probability of mass wasting. We field verified areas to ensure that the units were not on oversteepened slopes, and made necessary boundary adjustments. Selective harvest will help maintain rooting strength contributing to slope stability. Helicopter and skyline cable systems will also help minimize soil disturbance.

Selective harvest helps maintain slope stability.

8) Bridge and culvert surveys on critical streams identified design measures to help ensure debris and flood passage. Some structures are purposely oversized to reduce maintenance costs and water quality risks. We used stream channel stability as a primary criterion for stream crossing location. Some proposed crossing sites on King George Creek were discarded because they did not meet this criteria.

Road crossings were carefully selected.

9) Proposed harvest adjacent to streamside buffers often retains 30-50% of the trees in harvest units to help maintain habitat characteristics within riparian corridors and windfirm buffers.

We have provided a range of alternatives that varies the effects on the freshwater system. We have also taken into account the information needs of other cooperating agencies and will present the following information about each alternative:

- We will show the various components of the freshwater system including fish streams and their tributaries, floodplains and riparian areas, sensitive watersheds, upland sediment sources and wetlands including estuaries. Each component will be described in terms of its ecological role.

- We will display wetlands (including estuaries) and the direct and indirect impacts of proposed roads and units. Our analysis will discuss the role of wetlands in ecosystems and address any impacts resulting from proposed activities. The acres of wetland affected will be used as an indicator.

- An interagency site evaluation will address the potential effects of the LTF.

A log transfer facility evaluation is located in Appendix D.

- We will show all inventoried fish streams. Risk to fish will be evaluated using length of road, number of stream crossings, acres of harvest and proximity of harvest to streams as indicators.

- We will describe the relative sensitivity of watersheds in the project area and indicate possible harvest thresholds.

- We will address the relative risks of sedimentation based on site investigation of road and unit location.
- The Unit and Road Cards we display in the Appendix of this document show more detail about the streams and wetlands affected and the specific protection measures used, including Best Management Practices (BMP's).

Issue Four - Habitat Conservation

"The diverse wildlife populations including black bear, deer, elk, moose, as well as fur bearers such as mink and marten will likely be reduced due to timber harvest and the proposed road system."

"Goshawks, bears, wolves, moose, elk, deer, sea lions, etc. The cumulative impact on these and other wildlife species during and after the roading and cutting will result in population stresses from a variety of causes."

"This is the last large unfragmented area on N. Etolin and wildlife populations are effectively isolated from habitat on S. Etolin as the narrow corridor connecting north and south is severely fragmented by timber harvest, roading, and an active logging camp."

"I am also concerned about the effects on...wildlife from a timber sale of this size. Both Honeymoon and King George are relatively small watersheds. However, this is the last large area on Etolin Island which has not been broken up by timber cutting."

"The...Honeymoon Creek area (is) heavily used by winter birds–loons, Western grebes, varieties of gulls, all-year resident Canada geese, common and Barrow's goldeneyes, buffleheads, mergansers, trumpeter swans, and others. I believe having a log transfer facility at Honeymoon will very-negatively impact all these bird populations, not to mention the other wildlife in the area."

"I am concerned about the proposed timber sale units and proposed LTFs on North Etolin, aka. King George. Waterfowl, sea life, and scenery will be permanently damaged if any of this proposed sale is carried through.

What We Heard... Species conservation concerns include impacts to the natural plant and animal habitat diversity at various scales (i.e., individual stand, King George study area, and Etolin Island). Of particular concern are impacts to unique habitats; and threatened, endangered, or sensitive species such as the goshawk. Some wildlife species require relatively large areas of late-successional, old-growth forests. When trees are cut, this habitat may be altered. When very few trees are cut across a given area, there may be very little or no changes in the quantity or quality of old-growth habitat but, when most or all of the trees are cut in blocks across an area this may make the entire area unsuitable for some species. This is called *fragmentation,* and is another concern to the public and other agencies. We also heard concerns about harvesting specific areas such as the higher volume stands in the study area.

Our Response to What We Heard About Species Conservation Issues...

Appendix A summarizes the relationship of the King George area to the rest of Etolin Island.

1) We made considerable effort to examine the relationship of the King George study area to the rest of Etolin Island and are proposing to locate most harvest activities outside two of the most important conservation and corridor areas; lower King George Creek and the Red Mountain face area. The Kunk Lake saddle, Fishtrap Creek and the riparian corridors may also be important to the movement of wildlife. If an alternative proposes harvest in these areas we can reduce the effects through road management or the type of selective harvest we use.

Critical areas are avoided or mitigated.

2) Critical habitat "hot spots" include the King George estuary, riparian areas, southfacing slopes (for ungulate thermal values) and stands in the Honeymoon drainage with large trees. Some alternatives can avoid these areas entirely, while others modify harvest and roading to reduce the impact on these areas. For example, all alternatives avoid the King George estuary and the adjacent south facing slopes. Most alternatives harvest some south-facing areas, but long, thin units help maintain travel corridors. We also have concentrated proposed harvest on the less valuable thermal cover on north-facing slopes near King George Creek and on the Chichagof Face.

Partial cutting may reduce fragmentation and provide more diversity.

3) We propose the use of partial cutting to leave various amounts of trees in harvest units. The trees left provide structural diversity in forests over time which can retain the value of the area for some wildlife species. The entire Chichagof Face is proposed for small group or patch cut harvest. Because such methods are experimental in Southeast Alaska, we would monitor and adapt their use over time.

4) Under all alternatives, we want to maintain at least 50% of each land unit in an old growth or mature condition over time. To do this, we would have to harvest considerably less than this in some areas now, if we expect to harvest over time (ie. not take all the commercial timber now, and sustain a level of harvest over time). Many of the sub-areas, have more unsuitable than suitable lands for timber production. Thus, almost 2/3 of the entire study area will be forested old-growth over time, and several of the land units will have 60% or more forest in a mature or old growth condition.

Some roads may be closed to motorized vehicles after harvest.

5) Some roads, particularly in the King George Creek area, may be closed after harvest to reduce possible effects on wildlife by people. Alternatives that propose heavier amounts of harvest in some land units may also close roads, if there is not a need for the road for some time.

6) We conducted field surveys for marbled murrelets and goshawks. We did not find any nests during the surveys, but later we found evidence that goshawks may nest in the area.

We have also provided a range of alternatives that varies the effects on species conservation issues and will present the following information about each alternative:

- We will describe the effects on specific species that require old-growth forest conditions for all or part of their habitat needs. We'll also measure the current level of fragmentation on Etolin Island and the study area and describe the potential changes by alternative.

- Harvest will not affect currently listed Threatened or Endangered Species, but there are concerns for sensitive or special interest species such as the goshawk or marbled murrelet. We will reveal the methods and results of our inventories and disclose the effects of each alternative.

Old growth areas to be retained are designated primarily in the King George watershed.

- The current Tongass Land Management Plan requires us to set aside a percentage of old-growth. We will briefly discuss our method of selection, location and acres of retained old growth areas.

- We will describe the corridors that allow the movement of wildlife across landscapes and disclose our effects on them.

- Within each forest stand there are different sizes of trees, canopy levels, mixes of species and amounts of decaying logs and trees. This diversity is an important part of forest communities and habitats. By using selective harvest methods, we can retain some of this diversity over time, while still harvesting and growing timber for people's use and jobs. We will show the number of acres of each type of harvest method.

- In addition to freshwater systems and estuaries, we will evaluate the effects on the beaver pond and wetland area at the head of King George Creek and a high-volume stand of spruce, hemlock, and cedar near Honeymoon Creek.

Other Environmental Considerations

There are often minor issues we must disclose by law or that are brought up by the public. Although they were considered in our analysis, we won't spend a lot of time discussing these issues because this document is thick enough as it is, and we want to spend the bulk of the analysis on major issues. Other issues we will have minor effects on and briefly describe include:

- ***Subsistence***
- ***Cultural and Archeological Resources***
- ***Soil and Vegetative Productivity***
- ***Air Quality***
- ***Effects on Consumers, Civil Rights, and Women***

Chapter 2

Alternatives

Chapter 2

Alternatives

Introduction

In this chapter we describe the process we used to develop alternatives to the Proposed Action. We describe the alternatives we are studying in detail, summarize those alternatives we dropped, identify mitigation measures, and briefly compare the alternatives. We also identify a preferred alternative which is Alternative 5 with some considerations for scenery and harvest of small sales over time (see page 2-20).

Alternative Development

Alternatives are developed in response to four key issues.

The Proposed Action is only one approach to harvesting timber in the King George area. This chapter describes five other alternatives being considered. These other alternatives were developed to fulfill the **Purpose and Need for Action** and to respond to the **Key Issues** that were identified during our public involvement process. All of the alternatives were designed to address all of the Key Issues to some degree (see summary of the desired condition analysis in Appendix A). However, each alternative does 'solve' the Key Issues in different ways or to a greater extent than others. Again, the Key Issues are:

1. ***Scenic and Recreation Values***
2. ***Timber Sale Economics and Road Management***
3. ***Freshwater Systems and Estuaries***
4. ***Habitat Conservation***

Road Management Under the Alternatives- Managing roads for the future is a complex issue and must consider trade-offs between offering motorized access to the public; the cost of maintenance; the need to retain some areas as walk-in areas for both recreation, hunting, and wildlife habitat; and the need for roads in potential future harvest operations. The various alternatives propose different approaches to road management consistent with each alternative's theme or emphasis.

Alternatives Considered in Detail

Proposed Action (Alternative 5)

The 'Proposed Action' proposes the highest level of harvest that could occur in the King George Study Area while still meeting our management direction and desired future conditions. We will describe it first here, so that it is the basis of comparison for the other alternatives. Table 2-1 and Figure 2-1 display the specific activities. The Proposed Action would harvest approximately 26.6 MMBF of timber from about 1,357 acres.

Alternative 5 harvests the most timber while responding to scenery, freshwater, and habitat issues.

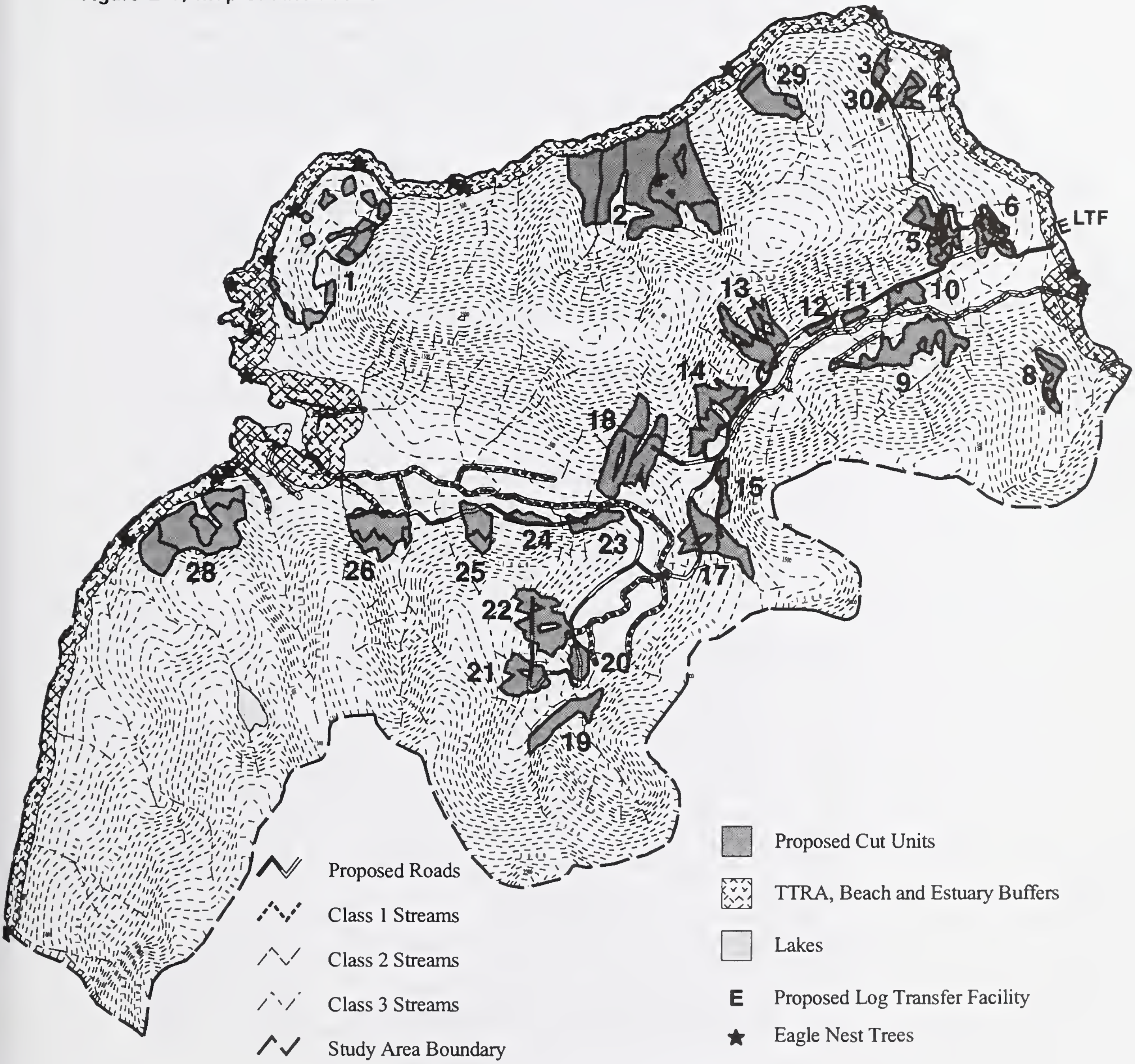
Approximately 12.7 miles of road would be constructed beyond an LTF just north of Honeymoon Creek. The Proposed Action would offer the most volume to potential large and small operators in the next five years, but little would be left for re-entry over the next 50 years (only about 4 MMBF). Approximately 124 acres would be suitable for small operators, which would provide the highest level over the next 5-year period, but little would remain to log over time. The most initial roading is also proposed, but since most of the available timber volume is removed, most of the roads could be closed about five years after harvest.

Table 2-1, Proposed Harvest Units in Alternative 5

Unit	Silvicultural Harvest Method	Acres	Yarding Method
1	Patch Cuts with 10% Retention Patch Cuts with 30% Retention	46 24	Helicopter
2	Group Selection with 70% Retention Individual Tree Selection with 50% Retention Patch Cut with Seedtree Residuals	131 159 7	Helicopter
3	Clearcut with 10% Retention	10	Cable
4	Individual Tree Selection with 30% Retention	19	Cable
5	Individual Tree Selection with 30% Retention Individual Tree Selection with 50% Retention Overstory Removal with 10% Retention	20 20 11	Cable, Skyline, Helicopter
6	Clearcut with 10% Retention Individual Tree Selection with 50% Retention	29 3	Cable or Shovel
8	Group Selection with 70% Retention Patch Cut with Seedtree Residuals	15 11	Helicopter
9	Individual Tree Selection with 50% Retention Overstory Removal with 30% Retention	5 71	Helicopter
10	Individual Tree Selection with 30% Retention	19	Cable
11	Individual Tree Selection with 30% Retention	7	Cable
12	Individual Tree Selection with 30% Retention	6	Cable
13	Clearcut with 10% Retention Overstory Removal with 10% Retention	30 27	Cable Helicopter
14	Clearcut with 10% Retention Overstory Removal with 10% Retention	33 22	Cable Helicopter
15	Individual Tree Selection with 30% Retention	14	Cable or Shovel
17	Clearcut with 10% Retention Individual Tree Selection with 30% Retention	35 22	Cable Helicopter
18	Clearcut with 10 % Retention Individual Tree Selection with 50% Retention Overstory Removal with 30% Retention	28 28 42	Skyline Helicopter
19	Individual Tree Selection with 50% Retention	36	Helicopter
20	Clearcut with 10% Retention	16	Cable
21	Clearcut with 10% Retention	36	Cable
22	Clearcut with 10 % Retention	61	Cable
23	Individual Tree Selection with 30% Retention	19	Cable
24	Individual Tree Selection with 30% Retention	11	Cable or Shovel
25	Individual Tree Selection with 30% Retention Overstory Removal with 30% Retention	23 9	Cable Shovel Helicopter

26	Individual Tree Selection with 30% Retention Individual Tree Selection with 50% Retention	41 20	Cable Shovel Helicopter
28	Group Selection with 70% Retention Individual Tree Selection with 30% Retention Individual Tree Selection with 50% Retention	77 13 49	Helicopter
29	Individual Tree Selection with 50% Retention Patch Cut with 30% Retention	36 13	Helicopter
30	Patch Cut with Seedtree Residuals	3	Cable

Figure 2-1, Map of Alternative 5



Alternative 1

Alternative 1 proposes harvest within one mile of saltwater, no roads, and helicopter logging.

Alternative 1 responds primarily to public concerns surrounding economic return, freshwater systems and habitat conservation (Issues 2,3 and 4). Fragmentation would be reduced in the interior portions of the study area by dropping units 11—26 along Honeymoon and King George Creeks. Since both Creeks are Class 1, anadromous streams, dropping these harvest units would also minimize impacts to those freshwater systems. Alternative 1 would leave the most volume available (about 16 MMBF) for potential future harvest entries, but roads would have to be constructed to remove it. Helicopters would be used to yard and transport the trees to the water rather than trucks, so no Log Transfer Facility (LTF) or roads would be constructed this entry. No clearcuts are proposed in Alternative 1 which would harvest approximately 14.1 MMBF of timber from about 888 acres. This alternative would be least attractive to small operators because few can afford the cost of helicopter logging. Table 2-2 and Figure 2-2 display the specific activities involved in Alternative 1. An asterisk (*) has been placed next to the units whose design and methods of harvest in Alternative 1 differ from those shown for the Proposed Action.

Table 2-2, Alternative 1 Harvest Units

Unit	Silvicultural Harvest Method	Acres	Yarding Method
1	Patch Cuts with 10% Retention Patch Cuts with 30% Retention	46 24	Helicopter
2	Group Selection with 70% Retention Individual Tree Selection with 50% Retention Patch Cut with Seedtree Residuals	131 159 7	Helicopter
3*	Individual Tree Selection with 50% Retention Patch Cut with Seedtree Residuals Patch Cut with 10% Retention	24 2 8	Helicopter
4*	Group Selection with 70% Retention Individual Tree Selection with 50% Retention Overstory Removal with 10% Retention	10 5 9	Helicopter
5*	Group Selection with 70% Retention Individual Tree Selection with 50% Retention Overstory Removal with 10% Retention Patch Cut with 10% Retention	16 14 29 5	Helicopter
6*	Patch Cut with 10% Retention	6	Helicopter
7*	Individual Tree Selection with 50% Retention Patch Cut with 10% Retention	7 7	Helicopter
8	Group Selection with 70% Retention Patch Cut with Seedtree Residuals	15 11	Helicopter
9	Individual Tree Selection with 50% Retention Overstory Removal with 30% Retention	5 71	Helicopter
10*	Individual Tree Selection with 30% Retention	16	Helicopter
16*	Individual Tree Selection with 50% Retention Patch Cut with Seedtree Residuals	3 2	Helicopter
27*	Group Selection with 70% Retention Individual Tree Selection with 50% Retention	12 17	Helicopter
28	Group Selection with 70% Retention Individual Tree Selection with 30% Retention Individual Tree Selection with 50% Retention	77 13 49	Helicopter

29	Individual Tree Selection with 50% Retention Patch Cut with 30% Retention	36 13	Helicopter
30*	Individual Tree Selection with 50% Retention Patch Cut with Seedtree Residuals Patch Cut with 30% Retention	3 1 6	Helicopter
31*	Patch Cut with Seedtree Residuals	2	Helicopter
32*	Individual Tree Selection with 50% Retention Patch Cut with Seedtree Residuals	19 7	Helicopter

Figure 2-2, Map of Alternative 1

Alternative 2

Alternative 2 harvests timber in the interior of the area, at the heads of watersheds. A road on the south side of Honeymoon Creek would be built.

Alternative 2 responds primarily to public concerns about scenery, roaded recreation, freshwater systems, and habitat conservation issues (Key Issues 1, 3, and 4). This alternative would reduce the visibility of harvest activities from Stikine Strait, Chichagof Pass, Zimovia Strait, and Zimovia Highway on Wrangell Island by dropping units 3—12, 27, and 28 from harvest. Harvest activities would be concentrated primarily within the interior portions of the project area and on slopes facing Chichagof Pass. Fragmentation would be minimized in the outer, saltwater-facing portions of the east side of the study area. This alternative harvests timber at the head of the freshwater systems and, in response to public concerns over fragmentation of the large stand in Honeymoon Creek, considers a road location on the south side of Honeymoon Creek (all other roaded alternatives propose this road on the north side). Approximately 10.8 miles of roads would be constructed into the Honeymoon and King George watersheds originating from an LTF north of Honeymoon Creek. About 10 MMBF might be available for future entries and about 60 acres of harvest would be suited to small operators. Alternative 2 proposes 239 acres of clearcuts (25% of the acres proposed for harvest) and produces about 19.5 MMBF of timber from about 968 acres. Several units harvested under the Proposed Action are not harvested in Alternative 2, but all units proposed under Alternative 2 are the same design as shown in the Proposed Action. Table 2-3 and Figure 2-3 display the specific activities involved in Alternative 2.

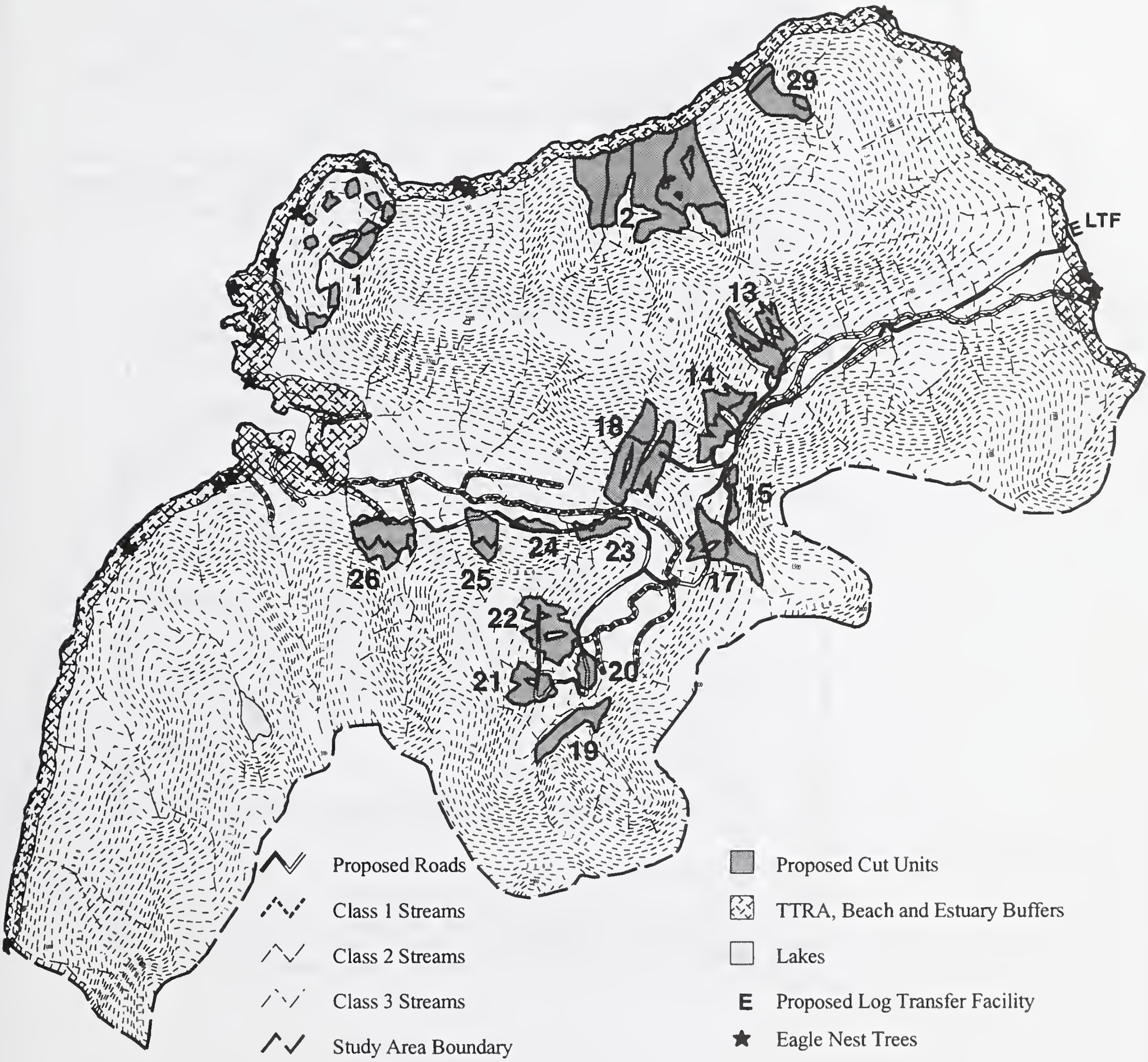
Road Management: Approximately 5 years after harvest operations are completed, only those roads west of the King George Creek crossing would be closed. Walk-in or non-motorized access would be welcome. The roads in the Honeymoon drainage would remain open and maintained for motorized access and recreation.

Table 2-3, Alternative 2 Harvest Units

Unit	Silvicultural Harvest Method	Acres	Yarding Method
1	Patch Cuts with 10% Retention Patch Cuts with 30% Retention	46 24	Helicopter
2	Group Selection with 70% Retention Individual Tree Selection with 50% Retention Patch Cut with Seedtree Residuals	131 159 7	Helicopter
13	Clearcut with 10% Retention Overstory Removal with 10% Retention	30 27	Cable Helicopter
14	Clearcut with 10% Retention Overstory Removal with 10% Retention	33 22	Cable Helicopter
15	Individual Tree Selection with 30% Retention	14	Cable or Shovel
17	Clearcut with 10% Retention Individual Tree Selection with 30% Retention	35 22	Cable Helicopter
18	Clearcut with 10% Retention Individual Tree Selection with 50% Retention Overstory Removal with 30% Retention	28 28 42	Skyline Helicopter
19	Individual Tree Selection with 50% Retention	36	Helicopter
20	Clearcut with 10% Retention	16	Cable
21	Clearcut with 10% Retention	36	Cable
22	Clearcut with 10% Retention	61	Cable
23	Individual Tree Selection with 30% Retention	19	Cable
24	Individual Tree Selection with 30% Retention	11	Cable or

			Shovel
25	Individual Tree Selection with 30% Retention Overstory Removal with 30% Retention	23 9	Cable or Shovel & Helicopter
26	Individual Tree Selection with 30% Retention Individual Tree Selection with 50% Retention	41 20	Cable or Shovel & Helicopter
29	Individual Tree Selection with 50% Retention Patch Cut with 30% Retention	36 13	Helicopter

Figure 2-3, Map of Alternative 2



Alternative 3

Alternative 3 avoids harvest in the lower King George watershed.

Alternative 3 emphasizes roaded recreation, scenic values, economic return, and freshwater systems (Key Issues 1, 2, and 3). Potential visual impacts from the ferry routes would be minimized by dropping units 3, 4, 25, 26, and 28. Dropping units 5, 10, 18, and 23-28 along Honeymoon and King George Creeks would reduce impacts to those freshwater systems. Approximately 7.7 miles of road would be constructed. There would be no harvest in the Lower King George watershed thus reducing effects to fisheries, wildlife, and scenic qualities. Alternative 3 would leave the most volume available for future entries that would be accessible from roads constructed this entry. About 75 acres would be suitable for small operators this entry. As in the Proposed Action, an LTF would be constructed north of Honeymoon Creek. Table 2-4 and Figure 2-4 outline the specific harvest activities for Alternative 3, which would harvest approximately 16.7 MMBF from about 894 acres. Alternative 3 would involve 240 acres of clearcut (27% of the acres proposed for harvest). Several units where harvest is proposed under the Proposed Action would not be harvested in this alternative, but all units proposed under Alternative 3 are the same as displayed for the Proposed Action.

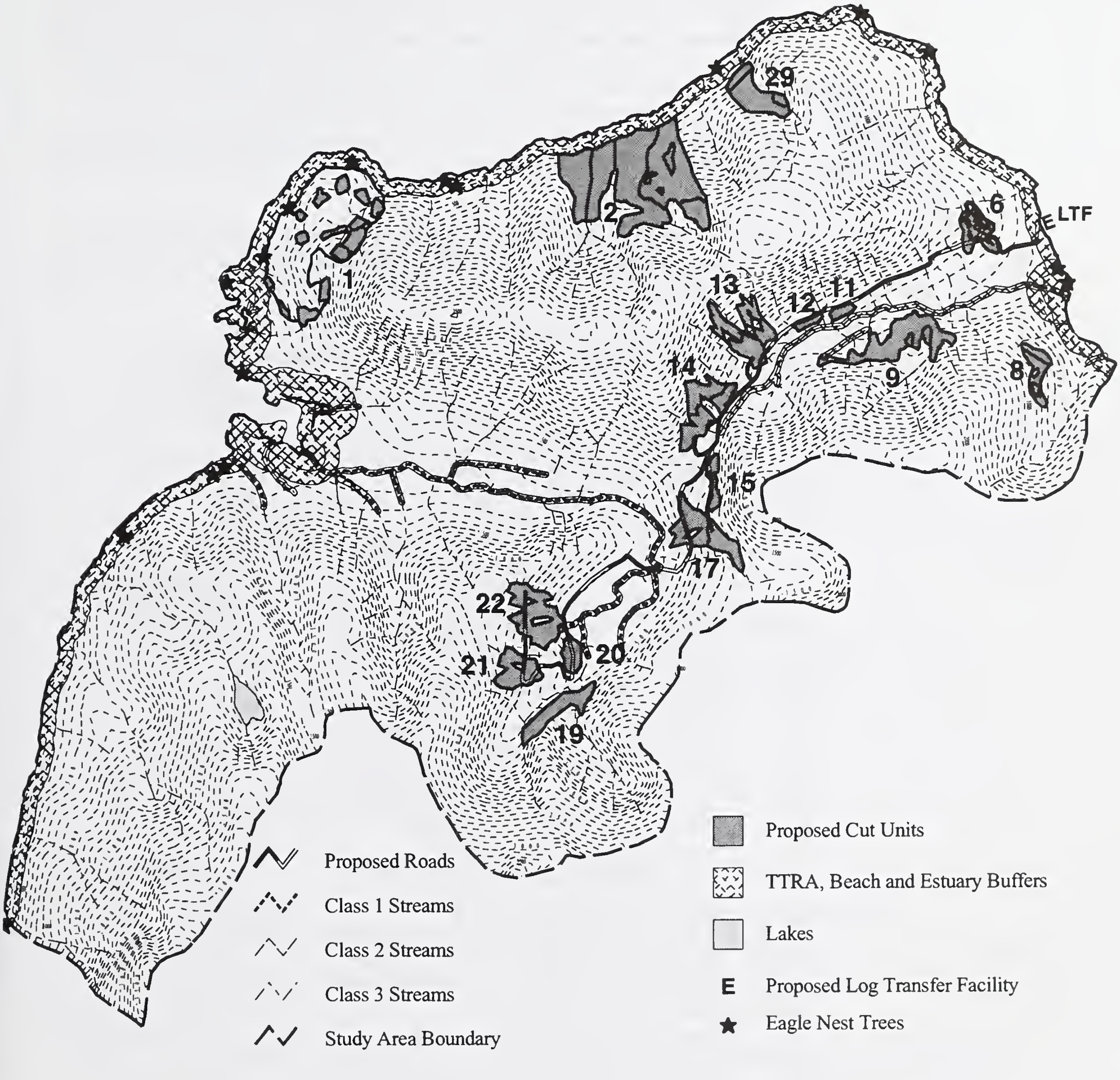
Road Management: Under this alternative, most roads would remain open to motorized access, except for temporary roads and the roads past Unit 20. Those roads to the west of the head of Honeymoon Creek (past Unit 20) would be closed and would be available for walk-in and non-motorized access.

Table 2-4, Alternative 3 Harvest Units

Unit	Silvicultural Harvest Method	Acres	Yarding Method
1	Patch Cuts with 10% Retention Patch Cuts with 30% Retention	46 24	Helicopter
2	Group Selection with 70% Retention Individual Tree Selection with 50% Retention Patch Cut with Seedtree Residuals	131 159 7	Helicopter
6	Clearcut with 10% Retention Individual Tree Selection with 50% Retention	29 3	Cable or Shovel
8	Group Selection with 70% Retention Patch Cut with Seedtree Residuals	15 11	Helicopter
9	Individual Tree Selection with 50% Retention Overstory Removal with 30% Retention	5 71	Helicopter
11	Individual Tree Selection with 30% Retention	7	Cable
12	Individual Tree Selection with 30% Retention	6	Cable
13	Clearcut with 10% Retention Overstory Removal with 10% Retention	30 27	Cable Helicopter
14	Clearcut with 10% Retention Overstory Removal with 10% Retention	33 22	Cable Helicopter
15	Individual Tree Selection with 30% Retention	14	Cable or Shovel
17	Clearcut with 10% Retention Individual Tree Selection with 30% Retention	35 22	Cable Helicopter
19	Individual Tree Selection with 50% Retention	36	Helicopter
20	Clearcut with 10% Retention	16	Cable

21	Clearcut with 10% Retention	36	Cable
22	Clearcut with 10% Retention	61	Cable
29	Individual Tree Selection with 50% Retention	36	Helicopter
	Patch Cut with 30% Retention	13	

Figure 2-4, Map of Alternative 3



Alternative 4

Alternative 4 avoids harvest in the entire King George watershed.

Alternative 4 emphasizes public concerns over economic return, freshwater systems, and habitat conservation (Key Issues 2, 3, and 4). Timber harvest would occur primarily along the slopes facing Chichagof Pass, Zimovia Strait, and Honeymoon Creek. Very little harvest would occur within the entire King George watershed, thus retaining one of the largest contiguous blocks of old-growth habitat in the area. Impacts to freshwater systems would be minimized in the King George watershed by dropping units 18-26. Approximately 16.2 MMBF of timber would be harvested from about 943 acres under Alternative 4. About 14 MMBF would be available for future entries, but almost all of it would need to be accessed with further road development in the King George watershed. Approximately 78 acres of the total proposed harvest could easily be logged by a small operator. Approximately 5.3 miles of road would be constructed originating from an LTF north of Honeymoon Creek. Alternative 4, as shown in Table 2-5 and Figure 2-5 below, would propose clearcutting on 82 acres (9% of the acres to be harvested). Again, an asterisk (*) has been placed next to those units that differ in design from those pictured under the Proposed Action.

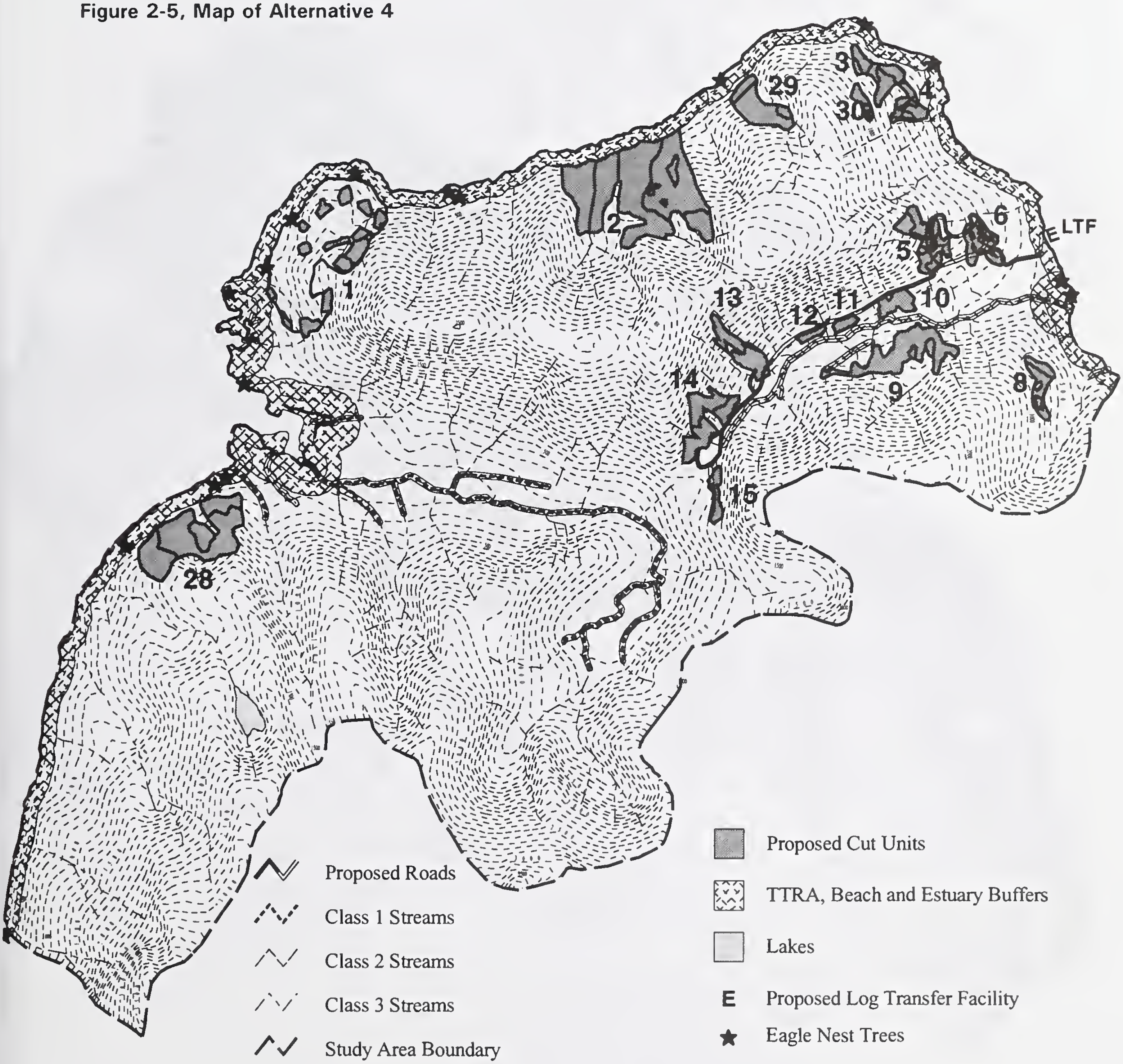
Road Management: The main road along Honeymoon Creek would remain open and maintained. All temporary roads leading from the main road into the various harvest units will be closed by waterbars and allowed to revegetate.

Table 2-5, Alternative 4 Harvest Units

Unit	Silvicultural Harvest Method	Acres	Yarding Method
1	Patch Cuts with 10% Retention Patch Cuts with 30% Retention	46 24	Helicopter
2	Group Selection with 70% Retention Individual Tree Selection with 50% Retention Patch Cut with Seedtree Residuals	131 159 7	Helicopter
3*	Individual Tree Selection with 50% Retention Patch Cut with Seedtree Residuals Patch Cut with 10% Retention	24 2 8	Helicopter
4*	Group Selection with 70% Retention Individual Tree Selection with 50% Retention Overstory Removal with 10% Retention	10 5 9	Helicopter
5	Individual Tree Selection with 30% Retention Individual Tree Selection with 50% Retention Overstory Removal with 10% Retention	20 20 11	Cable Skyline Helicopter
6	Clearcut with 10% Retention Individual Tree Selection with 50% Retention	29 3	Cable or Shovel
8	Group Selection with 70% Retention Patch Cut with Seedtree Residuals	15 11	Helicopter
9	Individual Tree Selection with 50% Retention Overstory Removal with 30% Retention	5 71	Helicopter
10	Individual Tree Selection with 30% Retention	19	Cable
11	Individual Tree Selection with 30% Retention	7	Cable
12	Individual Tree Selection with 30% Retention	6	Cable
13*	Clearcut with 10% Retention Overstory Removal with 10% Retention	20 15	Cable Helicopter
14	Clearcut with 10% Retention Overstory Removal with 10% Retention	33 22	Cable Helicopter

15	Individual Tree Selection with 30% Retention	14	Cable or Shovel
28	Group Selection with 70% Retention Individual Tree Selection with 30% Retention Individual Tree Selection with 50% Retention	77 13 49	Helicopter
29	Individual Tree Selection with 50% Retention Patch Cut with 30% Retention	36 13	Helicopter
30*	Individual Tree Selection with 50% Retention Patch Cut with Seedtree Residuals Patch Cut with 30% Retention	3 1 6	Helicopter

Figure 2-5, Map of Alternative 4



No Action (Alternative 6)

Alternative 6 would not harvest any portion of the planning area.

This alternative analyzes the effects of having no timber sale or road construction in the King George study area. This alternative is provided so that you can see the changes that the other alternatives have on the social, physical, and biological environment. This alternative is most responsive to scenic and recreation values, freshwater systems and habitat conservation by deferring harvest. It would not contribute to local employment or income.

Figure 2-6, Map of the No Action Alternative

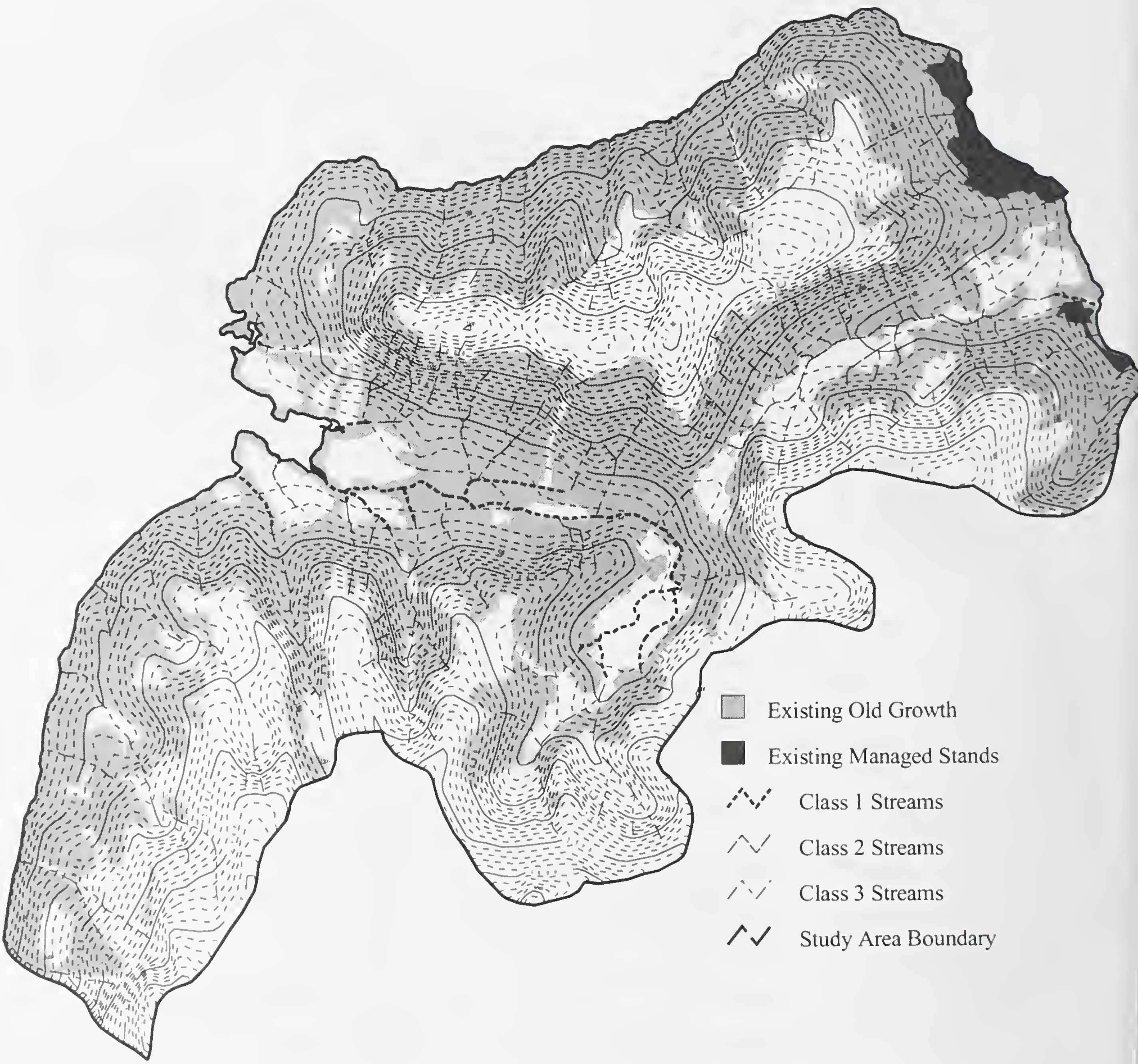


Figure 2-7, Designated Old Growth Retention - All Alternatives

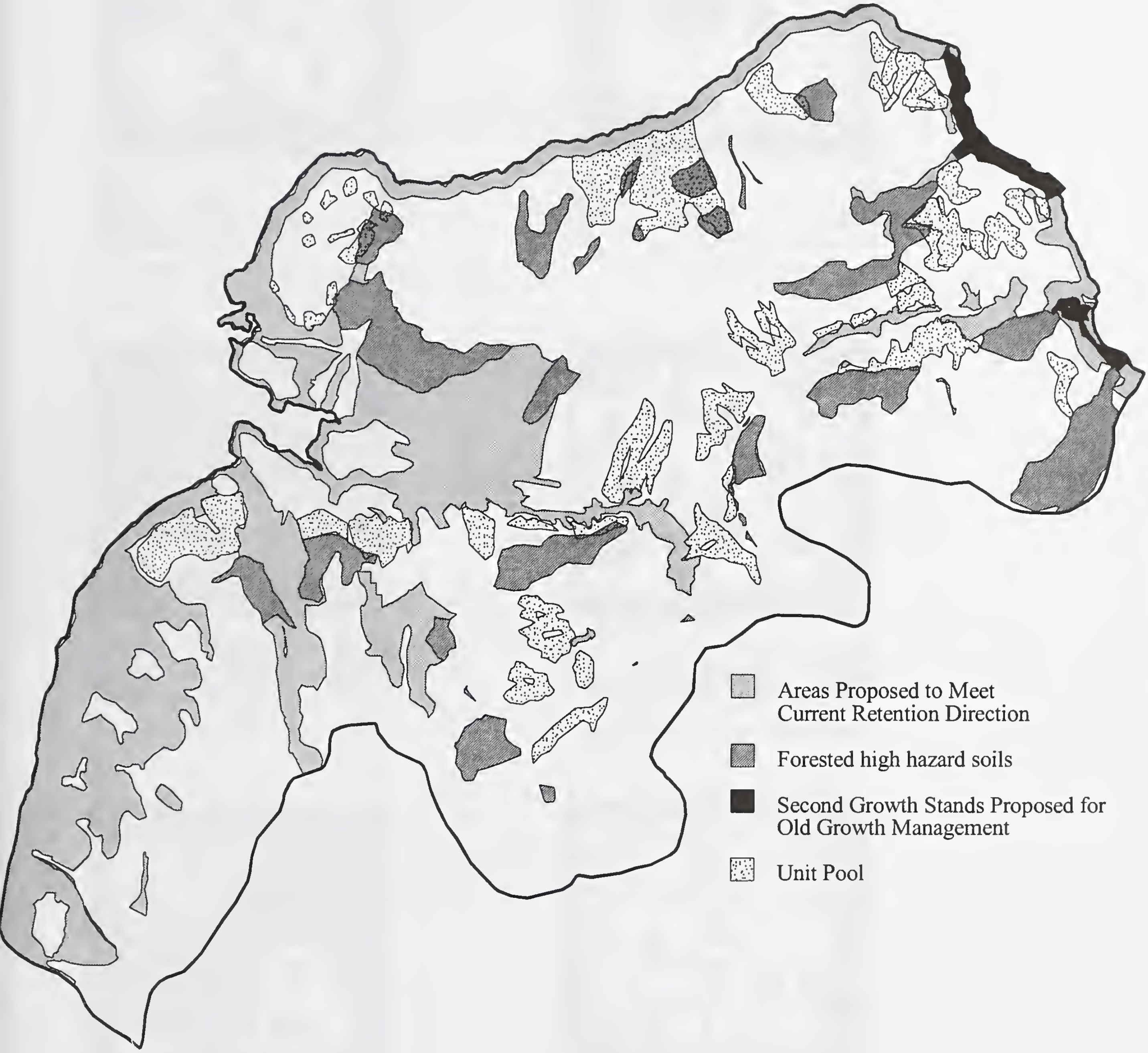
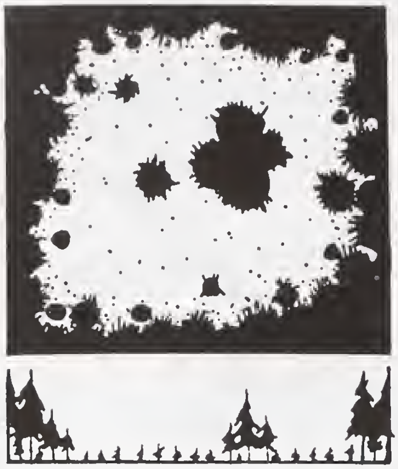
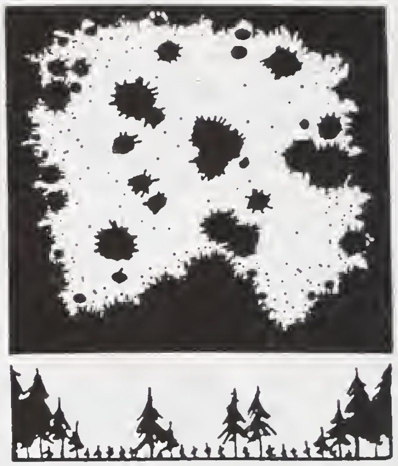


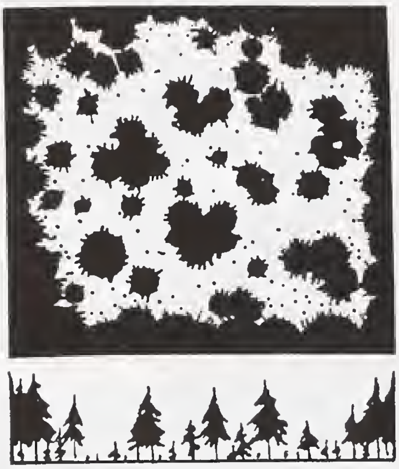
Figure 2-8, Illustrations of Various Harvest Methods - All Alternatives



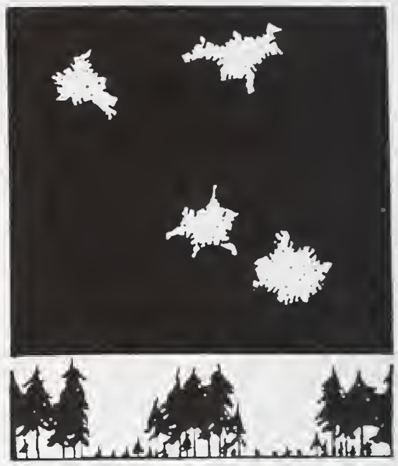
Clearcut w/ retention



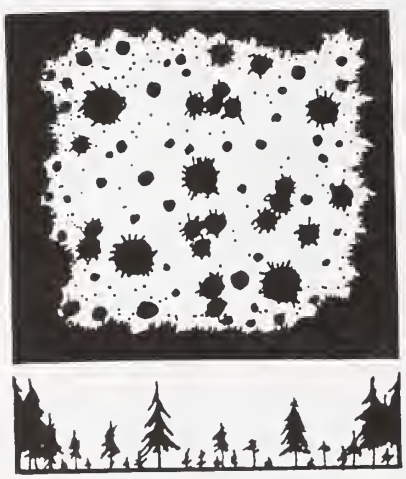
Individual tree w/ 30% retention



Individual tree w/ 50% retention



Group selection w/ 70% retention



Overstory removal w/ 10% retention

Patch cut w/ retention

Tables 2-6 and 2-7 compare treatment acres and predicted harvest volume for each of the action alternatives. It is important to note that differences in harvest prescriptions will result in different harvest volumes per acre. For example, a 100 acre volume class 5/6 block treated with a group selection prescription that retains 70% of the basal area, will remove approximately 40% of the standing volume and will show an average yield of 10-12 thousand board feet per acre. This theoretical 100 acre stand could be entered two or three more times in the next 100 years to harvest much of the remaining 70% in new groups as the first entry begins to mature.

Table 2-6: Alternative Summary for the King George Study Area

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6 No Action
Timber Harvest						
Manageable Acres Available	6303	6303	6303	6303	6303	6303
Proposed Treatment Acres	888	968	894	943	1356	0
% of Manageable Treated	14%	15%	14%	15%	22%	0%
Harvest Volume (MBF)						
Cable Volume	0	9,300	7,450	4,040	12,580	0
Helicopter Volume	14,060	10,200	9,250	12,130	14,060	0
Total Volume	14,060	19,500	16,700	16,170	26,640	0
Road Construction Miles						
Specified Road	0	9.8	6.6	4.8	12.4	0
Spur Road	0	1.0	1.1	.5	1.3	0
Total Road Miles	0	10.8	7.7	5.3	12.7	0
Log Transfer Site	No	Yes	Yes	Yes	Yes	No

Table 2-7: Harvest by Alternative ***(Acres)***

Land Unit Name	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
Chichagof Face	407	407	407	407	407	0
Honeymoon	178	111	246	276	298	0
Lower King George	66	230	9	39	260	0
Porcupine Gulch	10	0	10	10	10	0
Red Mountain Face	110	0	0	110	110	0
Upper King George	0	220	220	14	220	0
Zimovia Face	117	0	2	87	51	0
Total Acres	**888**	**968**	**894**	**943**	**1,356**	**0**
Estimated MBF	**14,060**	**19,500**	**16,700**	**16,170**	**26,640**	**0**

Table 2-8, Alternative Comparison Table

		Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
Scenery Values	Visible Acres Harvested in Zimovia Strait Viewshed	258 (9%)	67 (2%)	157 (5%)	259 (9%)	238 (8%)	0
	Visible Acres Harvested in Chichagof Pass Viewshed	131 (5%)	131 (5%)	131 (5%)	131 (5%)	131 (5%)	0
	Visible Acres Harvested in Stikine Strait Viewshed	175 (3%)	235 (4%)	65 (1%)	155 (2%)	374 (6%)	0
	Visible Acres Harvested in Bessie Peak Viewshed	95 (2%)	438 (7%)	385 (6%)	208 (4%)	533 (9%)	0
Economics	Volume	14,060 MBF	19,500 MBF	16,700 MBF	16,170 MBF	26,640 MBF	0
	Percent of Manageable Acres Treated	14%	15%	14%	15%	22%	0%
	Miles of Road Construction	0	10.8	7.7	5.3	12.7	0.0
	Miles of Road Open to Motorized Vehicles (after harvest)	0	4.0	4.4	3.8	0	0
	Net Stumpage	$23/MBF	-$3/MBF	$12/MBF	$11/MBF	$16/MBF	0
Freshwater System	Critical Stream Crossings	0	14	9	3	11	0
	Acres Harvested in Freshwater System	260	560	480	350	790	0
	Miles of Road in Freshwater System	0	9.8	6.7	3.3	9.7	0
	Wetland Acres Harvested	116	138	157	146	202	0
	Wetland Acres Roaded	0	22	9	4	17	0
	Acres Harvested on Mod to High Hazard soils	205	348	280	255	379	0
	# Feet of Road Construction on Moderate to High Hazard Soils	0	2,812	0	0	5,679	0

Wildlife Habitat

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
Habitat Capability as a % of Current Condition for: Deer Marten Black Bear Red Squirrel Hairy Woodpecker Brown Creeper	97% 95% 99% 96% 91% 97%	94% 94% 99% 95% 88% 90%	96% 95% 96% 96% 90% 95%	96%	92%	100%
Marten	95%	94%	95%	95%	90%	100%
Black Bear	99%	99%	96%	96%	96%	100%
Red Squirrel	96%	95%	96%	96%	92%	100%
Hairy Woodpecker	91%	88%	90%	90%	84%	100%
Brown Creeper	97%	90%	95%	96%	86%	100%
Travel Corridor Maintained to: Chichagof Face	Yes	Yes	Yes	Yes	Yes	Yes
Honeymoon	Yes	No	No	No	No	Yes
Red Mountain	Partial	Partial	Yes	Partial	Partial	Yes
Kunk Lake	Yes	Partial	Partial	Yes	Partial	Yes
Fishtrap Drainage	Partial	Partial	Yes	Yes	Partial	Yes
Acres in Patches Larger Than: 5,000 Acres	0	0	0	0	0	5,890
1,000 Acres	8,350	7,660	8,220	8,220	7,230	10,140
500 Acres	8,350	8,590	9,065	8,220	7,845	10,140
180 Acres	9,050	9,000	9,335	9,055	8,950	10,550
Weighted Mean Old Growth Block Size	1,960	1,350	3,120	1,860	1,155	5,390

Alternatives Dropped from Further Review

The initial scoping letter to the public identified a broad proposed action to harvest 30 million board feet. During our landscape and desired future condition analysis (see summary in Appendix A), we refined our proposed action to be more specific and determined that the highest volume we could expect to produce was approximately 25 million board feet by harvesting about 1300 acres.

Mitigation Measures for Alternatives 1-5

Site specific mitigation measures are identified in the Unit and Road Cards in Appendix B.

The Forest Service uses a variety of mitigation measures in the design and implementation of timber sales to avoid or reduce impacts to the environment. Some of these mitigation measures are required by law; for example, streamside buffers. Some are included in our policies for the Forest Plan. Others are very specific to a particular location or unit. These actions and their site-specific application are documented on the unit and road cards in Appendix B. Described below are the mitigation measures we will use for this project under all action alternatives.

Cultural Resources

Based on inventory work in the King George study area and elsewhere in Southeastern Alaska, we developed a model to help us locate those areas where cultural resources are most likely to be found. In addition to providing a basis for the comparison of alternatives, this model helps identify areas where we will intensively survey for cultural sites prior to any ground-disturbing activity. If additional cultural resources are located, appropriate mitigation and protection will be designed in consultation with the Alaska State Historic Preservation Officer.

Best Management Practices

Best Management Practices (BMPs) are practices and operating procedures designed to protect water quality. The BMPs are the result of extensive efforts between the Forest Service and the State of Alaska to identify practices that will ensure that timber harvest activities minimize soil erosion and meet State water quality standards. The unit and road cards in Appendix B, and the log transfer facility design card in Appendix D, describe site-specific application of BMPs.

Stream-side Buffers

The Tongass Timber Reform Act mandates a minimum 100-foot wide, no-harvest buffer on both sides of all Class I streams and on those Class II streams that flow directly into Class I streams. Some streamside buffers in this project are wider than 100 feet in response to site-specific conditions such as the stream channel type and the width of floodplains. Specific information about streamside buffers is located on the unit cards in Appendix B. Research indicates that these buffers are effective in providing shading, bank-stability, and a continued supply of large wood; key elements in maintaining the productivity of the freshwater system.

Marbled Murrelets

Marbled murrelets are known to occur in the waters around the study area and there is evidence that they nest in the study area. No nests have been located. If a nest is located, we will implement a minimum 30-acre buffer surrounding the nest. Roads will be kept

out of these buffers whenever possible, but if unavoidable, will be located the furthest possible distance from actual nest sites.

Goshawks

Field surveys for goshawks were conducted from 1992-1994, but they were conducted before the proposed harvest units were designed, so many units were not surveyed. One goshawk was observed within the planning area in 1994. Although no nests have been located, possible evidence of a nest area was found in one unit in 1995. The goshawk is not presently classified as Threatened or Endangered, but it is recognized as a Regional Sensitive Species. If a goshawk nest should be found in the study area during this project we will implement the recommendations found in the "Interim Habitat Management Recommendations for the northern goshawk; Tongass National Forest 1992." A copy of these guidelines is available from the Stikine Area Forest Supervisor's office in Petersburg, Alaska.

Key Wildlife Habitats and Timing Restrictions

No harvest is scheduled within 500 feet of the beach or within 1000 feet from the King George and Honeymoon estuaries. Minimum clearing widths will be used on the road and log transfer site north of Honeymoon Creek if it is constructed. The location for the proposed transfer site was selected because it had the least environmental effects of the seven sites studied. In addition, we located the sort yard outside of the beach fringe.

Blocks of old growth habitat have been designated in the project area for all alternatives and are shown above in Figure 2-6. These blocks of habitat were selected where they could do the most good for wildlife, according to Forest Plan direction. Harvest is precluded in these areas. In addition, more old growth will remain in areas which are classified as unsuitable for timber production (such as very steep areas).

Roads may be closed in some alternatives (see alternative descriptions). Road closures can be useful in reducing the hunting and recreation pressure on certain species of wildlife. If closed, roads would be available for walk-in recreation, but not motorized recreation. Road closures within the King George Creek watershed would have the most value to wildlife since this area contains most of the retained blocks of old growth. Temporary roads will be closed and seeded after harvest.

Helicopter flight guidelines will ensure the protection of eagle nest trees in the project area. Repeated helicopter flights within 1/4 mile of nest trees will be avoided from March 1- May 31. If nest trees have young, we will extend additional protection from May 31- August 31. Helicopters will be restricted from flying near sea lion haulouts and whales.

Logging Camp

Due to the proximity of the project site to Wrangell, no logging camp is being planned within the project area.

Log Drops and Storage

Storage of logs within log booms and drops of logs from helicopters into saltwater will take place in water with a minimum depth of 60 feet. Logs dropped directly into saltwater will be dropped within the confines of log booms. As part of the timber sale contract, we will require regular cleaning of floating debris that escapes the confines of

log booms. This should help, but not completely eliminate the possibility of limbs getting caught in fishing nets.

Preferred Alternative

We prefer Alternative 5 with some considerations for small sales over time and the scenery of Zimovia Face.

The **Preferred Alternative** is Alternative 5, the proposed action. We would like some comments on some changes we are considering:

- Harvesting units 3, 4, 30 and part of unit 5 on the Zimovia Face with helicopter partial cuts. The road would be constructed only to unit 5. This would address many of the scenic quality concerns of Zimovia Highway residents.

- Administratively deferring harvest of harvest units 6, 10, 11 and 12 as future small sales and changing the harvest prescriptions for units 10-12 to include a combination of individual tree selection and patch cuts (1-5 acres). This lower honeymoon area could be managed for high quality wood fiber (large trees with pruning and thinning) and riparian values over time.

- Administratively offering small sales with harvest units 15, 20, 23 and 24 before the road is closed at the King George Creek bridge. We would maintain the Honeymoon road system to the bridge over time.

At this time, we feel that Alternative 5 with the above considerations is the best possible alternative because:

- It best discloses the effects of cumulative harvest over time.
- It introduces alternative harvest methods that we believe will allow timber to be harvested, while protecting scenery, recreation, and wildlife habitat.
- The alternative has the most options for small sales, particularly in the future.
- It minimizes effects on important old growth areas by deferring harvest in the Red Mountain and the King George estuary areas.
- The alternative is designed to strike a balance in road management by keeping the Honeymoon road system open for motorized recreation while closing the King George road system to motorized traffic. This approach minimizes maintenance costs, protects wildlife populations and habitat and favors walk-in or biking recreation opportunities.

Your Turn...

This recommendation is not a decision. The primary purpose of this DEIS is to inform you about our analysis and about what we perceive at this time to be the best approach for management of the King George study area, and to find out what you think about it *before* we make a decision. We want to hear whether you think we've addressed the issues adequately under each alternative. Once we have your input, we will consider the need to revise, drop, or add issues and alternatives. If so, additional analyses would be conducted and this DEIS would be revised to become the *Final Environmental Impact Statement. (FEIS).* The Forest Supervisor will then use the information in the FEIS and your comments to make a final decision. The final decision, which may be different from what we're recommending at this point in the DRAFT, would be documented in a Record of Decision. If you would like to provide comments to this DEIS, you may write to us at Wrangell Ranger District, ATTN.: King George Team, PO Box 51, Wrangell AK 99929. If you would like to visit or call us, we're located at 525 Bennett Street in Wrangell and our phone number is (907) 874-2323.

Chapter 3

Affected Environment and Environmental Effects

Chapter 3

Affected Environment and Environmental Effects

Introduction

In this chapter, we describe the environment that will potentially be modified by this project (affected environment), and the effects of the six alternatives on the environment (environmental effects). This chapter is divided into two main sections:

Effects on the Key Planning Issues - In this section, we will describe the effects of each alternative on the four key planning issues.

Other Environmental Considerations - In this section we discuss some of the other environmental considerations required by various laws.

Effects on the Key Planning Issues

The Council on Environmental Quality (CEQ) issues guidance to the Federal Agencies to determine the significant issues concerning any proposal and to eliminate those issues which are not significant. With the help of the public and other agencies, we identified four issues which were significant enough to be examined in detail given the nature of the proposed action. In this section, we describe the environmental effects associated with these four issues.

Issue One: Scenic and Recreational Values

Scenic Resources

"I don't understand why we can't have one island near Wrangell that is left alone! Why can't you pick on other islands or on the mainland, away from where we have to look at it all the time."

"We consider the King George area very scenic and spend time there often...While we could accept some cuts in this area, logging it all would create an eyesore out of a beautiful place."

"We can see the King George project area from our living room window and to see logging there won't hurt our feelings."

Partial cutting is the main harvest method.

The above comments show the range of opinion about the scenic importance of this area. Some felt that the area should be left alone, others think that some careful logging could take place, and some 'see' any logging as positive. Based on this range of opinions, we responded by often using other techniques besides clearcutting, so that any harvest units seen would not be as stark a contrast to the surrounding area. These techniques are used in all alternatives. However, the range of alternatives does vary the amount of harvest that would occur from different views. For example, some of you felt that we should not harvest the Zimovia Face while others felt that some harvest there would be fine. Therefore, the alternatives vary from no harvest to some harvest with small clearcuts or partial cuts. In listening to the various opinions, we tried to find a balance so that all alternatives are responsive to this issue while still realizing that there is not agreement on how much timber should be harvested from different areas. In your comments to this DEIS, you can further assist us by telling us what you do or don't like about the alternatives and how you think we could do a better job. It helps us most if you can be as specific as possible about areas you feel we could improve.

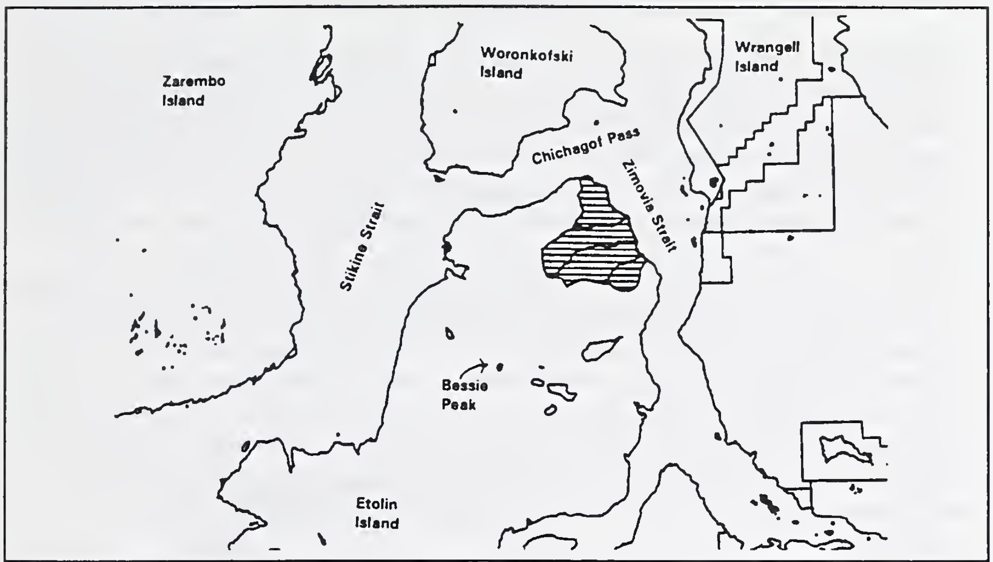
In response to public comments we:

1. Used other techniques besides clearcutting in most areas to avoid stark contrasts between harvested and unharvested areas. We also designed some units to look like natural disturbances such as blowdown or landslides.
2. Developed alternatives that did not harvest some areas at all. We also varied the amount of roading that would take place among the alternatives.
3. Did not propose to harvest any more than 14% of any viewshed so that harvest would not dominate the scenery.
4. Designed the log transfer site to minimize cutting into the rock and slopes near the shoreline. Rock pits and sort areas are located 1/2 mile from the beach.

So that you can see the differences in each alternative, our analysis looks at four travel routes around or in the King George Study Area. These travel routes include Zimovia Strait, Chichagof Pass, Stikine Strait, and Bessie Peak. Most scenic viewing of the study area occurs from these travel routes.

Zimovia Strait Viewshed

Figure 3-1: Zimovia Strait Viewshed



This viewshed includes everything you can see of the study area from Zimovia Highway, residences, and waterways. The viewshed is made up of the Zimovia Face, Honeymoon North, Honeymoon South, and Porcupine Gulch Land Units.

Zimovia Face is the most sensitive viewshed in the project area.

Zimovia Strait provides marine access to points south, including Thoms Place, and Kunk Lake Trailhead. This viewshed is well known and familiar to the residents of Wrangell Island, since they view it from Wrangell for long periods of time. Some see the area from their homes and are concerned about what they will see if it's harvested. Others indicated that they would have no problem with clearcutting in this viewshed, however the more prevalent comments pushed to minimize clearcutting. Alternative harvest methods to clearcutting were suggested by some respondents.

Old harvest units affect views of Zimovia Face.

Of the 3,771 acres included in this viewshed, approximately 2,949 acres (or 78%) are inventoried as "seen" from the water, and visually sensitive to harvest. Designing future harvest in this area is further complicated by previous harvest. The most visible harvest unit is 160 acres in size and was clear-cut in 1965. This unit is recovering visually, with the trees growing back to almost 1/3 the height of the surrounding trees. A limited amount of selective harvest around this unit could actually improve its visual recovery as long as it softens the straight lines without adding significantly to its perceived size. There are almost no other visible openings except those that are man-made, so any additional harvest is more likely to "stand-out." However, there are several pockets where the cedar is dying (seen as a gray cast of dead trees). There is an opportunity to harvest these dead trees in such a way that it can improve the scenic condition of the area by softening the lines of the existing clearcut.

Roads and cable logged units will have more effects than helicopter units.

Another issue in this viewshed is the visibility of the transportation system. If we harvested by using cable systems, we would need to build a road across the Zimovia Face land unit. Also, since less trees can be left in cable logged units (as compared to helicopter yarding) the size of harvest units would have to be smaller to meet scenic quality objectives. Thus, some of the alternatives we developed use cable yarding and some use helicopter yarding. If roads are built, there is a need for a log transfer site at the

beach to get the logs to water. This log transfer site would be located in this viewshed almost directly across from the Pat's Creek log transfer site on Wrangell Island.

Effects of the Alternatives on Views from Zimovia

The proposed log transfer facility is about 1/4 the size of Pat's Creek LTF.

Effects of the Proposed Log Transfer Facility (LTF) Site- **Alternatives 1 and 6** do not propose to construct a log transfer facility. **Alternatives 2, 3, 4 and 5** propose to construct a log transfer facility on Zimovia Strait. The LTF would consist of a low angle ramp (similar to the ramp at Earl West, locally known as 'Venus', Cove). A bulkhead for watering logs would not be necessary. Logs would be taken down the ramp to water or be floated off the ramp by the tide. The tree clearing opening along the beach would be approximately 100 feet and the height of backwalls from hillside excavation would be approximately 24 feet. By comparison, the LTF at Pat's Creek has approximately 400 feet of clearing and a 100 foot high backwall. Additionally, the Pat's Creek LTF has a permanent watering ramp and two bulkheads. The larger bulkhead at Pat's Creek is about 100' long and 24' high (partially visible from a -2' to a +22' tide), and the smaller equipment bulkhead is comparable to what is being proposed for King George (about 20' wide and 16' high, partially visible from a -2' to a +14' tide). The visual impact of the Zimovia Strait LTF would be minor as seen from the residences on Wrangell Island, having approximately 1/4 the visual impact of the Pat Creek LTF from the Zimovia waterway.

The greatest visual impact comes from building road across Zimovia Face.

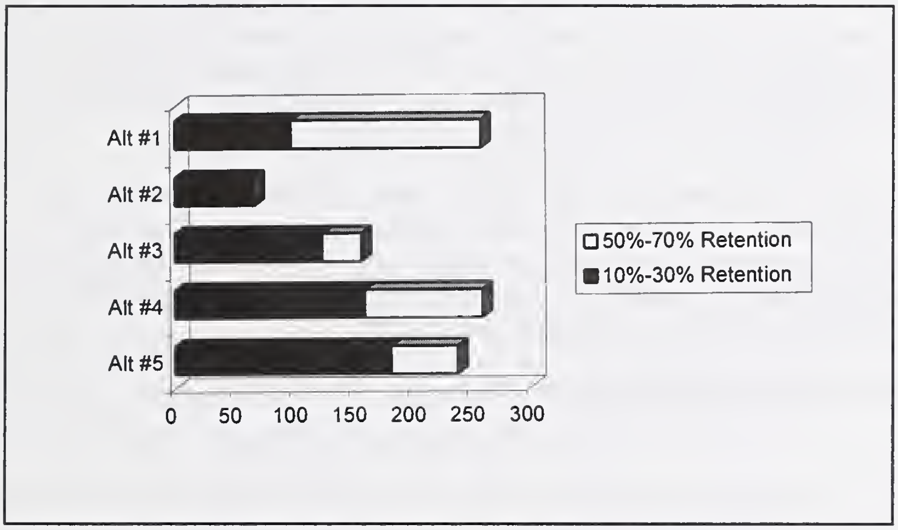
Effects of Road Construction- **Alternatives 1 and 6** construct no roads and would not have any visual effects from roading. **Alternative 5** (Proposed Action) would construct a road across Zimovia Face and on the north side of Honeymoon Creek within the Zimovia viewshed. Most of the length of these two roads would not be seen since they usually follow flat terrain and clearing widths would be minimized. However, segments of roads will be seen in some harvest units; at major stream crossings, where roadway excavation exceeds 10 feet at cutslopes, and at some rock quarries. We estimate that 8 segments of road will be seen from the Zimovia Strait travelway by implementing the Proposed Action. The greatest visual impact results from building the road across Zimovia Face. For this reason, we considered other alternatives to this road such as not harvesting or using helicopter systems. **Alternative 2** would only construct a road up Honeymoon Creek on the south side and since there would be no harvest along this road, it would not be seen. **Alternative 3** would construct a road on the north side of Honeymoon Creek but harvest of Unit 6 would likely make the road visible in this one location. **Alternative 4** relies on a combination of helicopter and cable yarding and would only build a portion of the Zimovia Face Road. We estimate that two short portions of road would be visible across Units 5 and 6 under Alternative 4.

Effects of Harvest- Table 3-1 and Figure 3-2 show how many visible (or "seen") acres of the Zimovia Viewshed would be harvested under each alternative. We also show a breakdown of the harvest method. For example, those acres that will be harvested by leaving 70% of the trees standing (GR7-Group Selection prescription) are depicted in the "70% trees left" category. Acres treated with a goal of leaving 10% of the trees standing, whether by overstory removal, patch cut, or clearcut methods (OR1, PR1, and CR1 prescriptions), are depicted in the "10% trees left" category. The "100% trees left" category includes those seen acres which will not be harvested or areas of uncut trees within large harvest units. These harvest prescriptions are explained in greater detail in Chapter 2. In order to show the effects on what you can actually see, only those acres which can be seen from the water are included in the table and graph (the percentage of "total acres" of the viewshed treated would be less).

Table 3-1: Seen Acres Harvested in the Zimovia Strait Viewshed

Trees Retained	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
10% Trees Retained	65	67	97	109	118	0
30% Trees Retained	33	0	27	51	64	0
50% Trees Retained	119	0	18	73	40	0
70% Trees Retained	41	0	15	26	16	0
100% Trees Retained	2,691	2,882	2,792	2,690	2,711	2,949
% of Seen Acres Treated	9%	2%	5%	9%	8%	0%

Figure 3-2: Seen Acres Harvested in Zimovia Strait Viewshed



As illustrated by the above bar graph, only those areas leaving 10-30% of the trees within harvested areas would actually be seen by someone casually observing the area. Harvest leaving 50% or more of the trees would not be noticed by most people, but does present some risk if the trees left blew down. Although we are confident that not all trees will blow down in most areas, there is some unknown risk with this technique, which has not been widely applied in Southeast Alaska. Harvest in the 70% leave category would not likely be seen at all and is fairly resilient to blowdown. Effects of the alternatives are described in order of increasing visual impacts.

Zimovia Effects Summary

Of the action alternatives, Alternative 2 has the least effect on views from Zimovia Highway.

Alternative 6 (the "no action alternative") has less overall impact to scenic resources in general since there is no harvest, roading, or log transfer site. There is no risk of additional blowdown caused by experimentation with harvest methods. However, there is also no potential improvement possible of the existing clearcut and no salvage of dying stands of yellow-cedar.

Alternative 2 has less visible harvest than any other 'action' alternative from the Zimovia travel route. All units are located far up the Honeymoon Creek drainage and are not directly across from Wrangell Island views. Alternative 2, like Alternative 6, does not attempt to harvest dying yellow-cedar or take the risk of possibly improving the visual

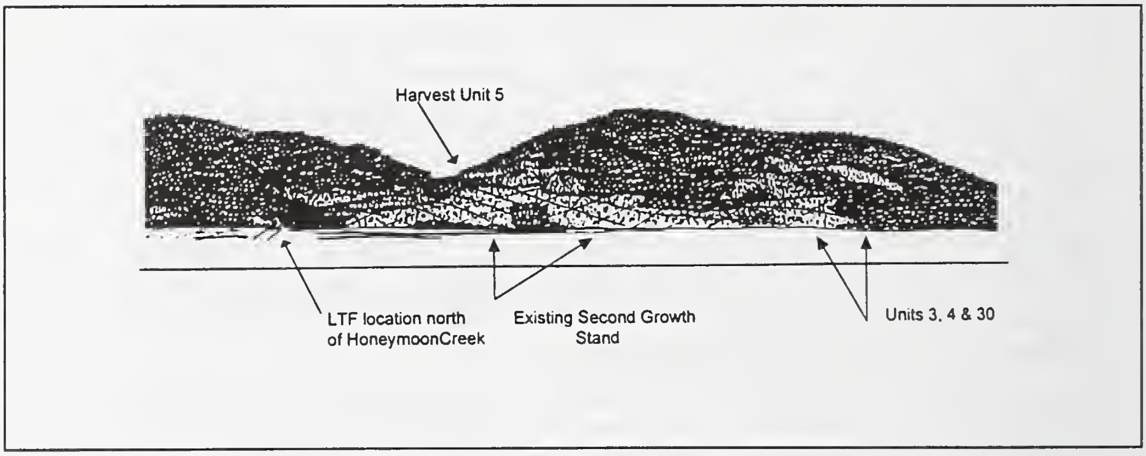
appearance of past harvest. There is no visible road construction, but Alternative 2 does include construction of the log transfer site with the effects described above.

Alternatives 3 and 1 have similar visual impacts, but for different reasons. Although the graph above shows that more acres will likely be seen in Alternative 3 than Alternative 1, it does not take into account that most of those 'seen acres' are in the background and far up the Honeymoon drainage, thus they are only visible from a few locations and from an oblique angle. Like Alternative 2, the harvest units in Alternative 3 are primarily located in the Honeymoon Creek drainage but are closer to the mouth of the Creek where they have the potential to be seen by Zimovia travelers. Alternative 3 would also construct the log transfer site and a road across Unit 6. Although the graph above shows that Alternative 1 has less acres that are likely to be evident (the black in the bar graph) than Alternative 3, the opposite is true if you only take the views from Zimovia Highway into account. When viewing from Zimovia Highway, proposed harvest in Alternative 1 will be much more apparent than those units proposed in Alternative 3. Alternative 1 would involve more acres of total harvest in the Zimovia viewshed, but a large percentage of the harvest leaves 50% or more of the trees (however, this could present a greater risk if blowdown were to occur). Since Alternative 1 would involve all helicopter yarding, we can harvest more acres with less visual impact than alternatives that use cable systems. Alternative 1 does not involve construction of the LTF or any roads.

Alternative 5 has the most effect on Zimovia views due to cable harvest and roads.

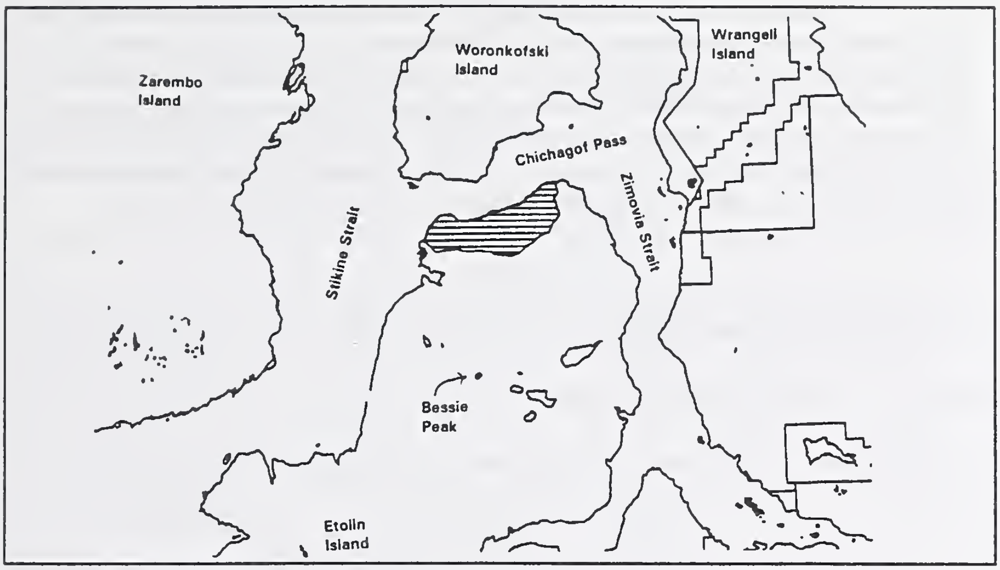
Alternatives 4 and 5 have similar timber harvest effects, but Alternative 5 would have greater visual impact due to the construction of the road and more reliance on cable yarding on Zimovia Face. This is true, even though Alternative 4 has more total acres of harvest in the viewshed, because a larger portion of the harvest of Zimovia Face is accomplished using helicopter yarding and partial cutting.

Figure 3-3: Alternative 5 (Proposed Action) as seen from Zimovia Strait



Chichagof Pass Viewshed

Figure 3-4: Chichagof Pass Viewshed



The Chichagof Pass Viewshed contains only one land unit; Chichagof Face Land Unit. Because this landscape rises steeply from saltwater, it is viewed at an oblique angle from Chichagof Pass. Marine traffic passes by in an east/westerly direction, and views the hillside in the middleground distance. This is a sensitive travel route due to its proximity to Wrangell and its role as a link between Stikine and Zimovia Straits. Chichagof Pass occasionally acts as an alternative passage for the Alaska Marine Highway.

The characteristic landscape is undulating ridges and steep valleys rising to elevations of 2,630 feet at its highest, most central peak. The western most edge of this Land Unit is rolling with numerous small knobs, hills, and valleys. Persons accessing the King George Bay area pass by this landform in the foreground distance. Most prevalent viewing occurs from the ferry and cruise ship route of Stikine Strait. There are some natural openings in the alpine along with small patches of blowdown and some landslides at lower elevations. The presence of these natural openings makes designing harvest easier if these patterns are copied. All acres contained in this land unit are visible from the water, making it highly sensitive.

Chichagof Effects Summary

Alternative 6 would not harvest at all in this viewshed, thereby avoiding any detrimental effects or risk to the visual resource. Although this viewshed is sensitive, we felt it was one of the best locations in the study area to try partial cutting. The potential for successful application of non-clear-cut methods is high while the potential detrimental effects to other resources (water, fish and wildlife) is low. Therefore, all 'action' alternatives propose the same harvest of Units 1, 2 and 29 in the Chichagof viewshed and land unit. There are no roads proposed (due to the steep terrain) and all yarding of logs would be done with a helicopter. Harvest units are designed to blend with the landscape and take advantage of the diversity of the terrain found there.

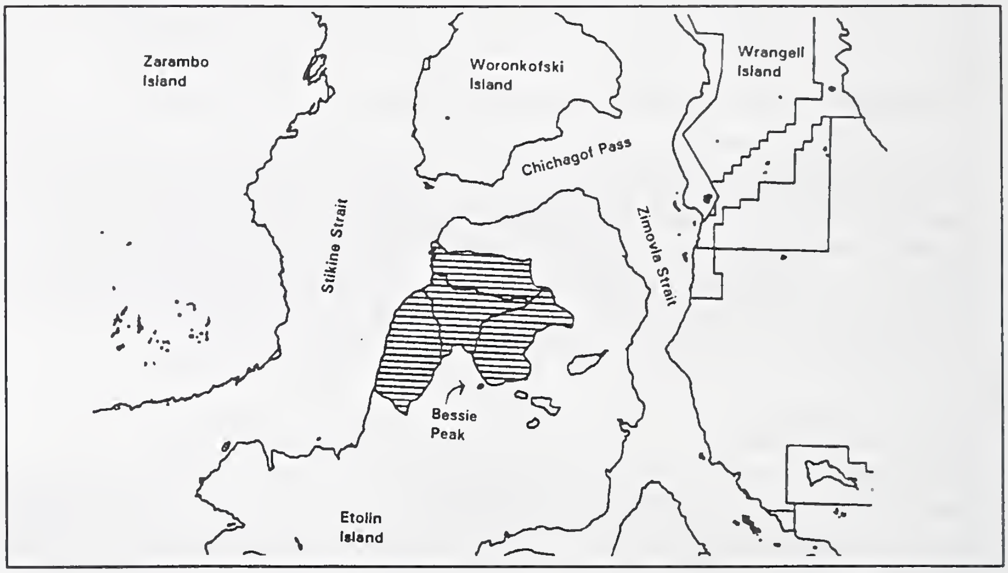
All action alternatives propose the same three partial-cut units on Chichagof Face.

Harvest on Chichagof Face would be largely unnoticeable.

In all action alternatives we propose to treat 131 acres by group selection, leaving 70% of the trees standing. None of these units will likely be seen. In all alternatives, we also propose 202 acres of harvest leaving 50% of the trees in the units. These units will not be evident to the casual observer. If portions of the units are visible, they are designed to blend in well with the landscape. Additionally, all alternatives propose to treat 31 acres with 30% of the trees left standing, and 43 acres leaving 10% of the trees standing. Although these areas will likely be seen, they are small harvest units and spread out across the viewshed. Most people will assume they are patches of blowdown since they will look very similar. The use of these harvest methods does present a risk of blowdown by exposing the trees we leave standing in harvest units to winds. The risk is greater in units that leave less trees. However, significant blowdown that would effect the visual appearance of the units is not expected.

Stikine Strait Viewshed

Figure 3-5: Stikine Strait Viewshed



This viewshed is comprised of the Lower King George North Facing, Lower King George South Facing, Upper King George, and Red Mountain Land Units. The Alaska Marine Highway and the cruise ships use Stikine Strait to provide access to Wrangell and Ketchikan. View from these marine travel routes are seen in the middle to background distances. Views of the Red Mountain area are dramatic, with alpine areas that reach 3,920 feet in elevation.

Within this viewshed, unique landscapes are found in King George Bay and estuary as well as the Red Mountain area. The estuary is a recreation attraction, with users from Wrangell enjoying the beaches, scenic views and intertidal area surrounding the bay. There are also several old landslides, some of which run the length of the slope. These slides, alpine openings, and mountain peaks provide natural diversity and help make the area one of the most scenic in the study area. The acreage of these four land units totals 9,514 acres of which 6,327 acres (or 67%) can be seen from the waterways.

Stikine Strait Effects

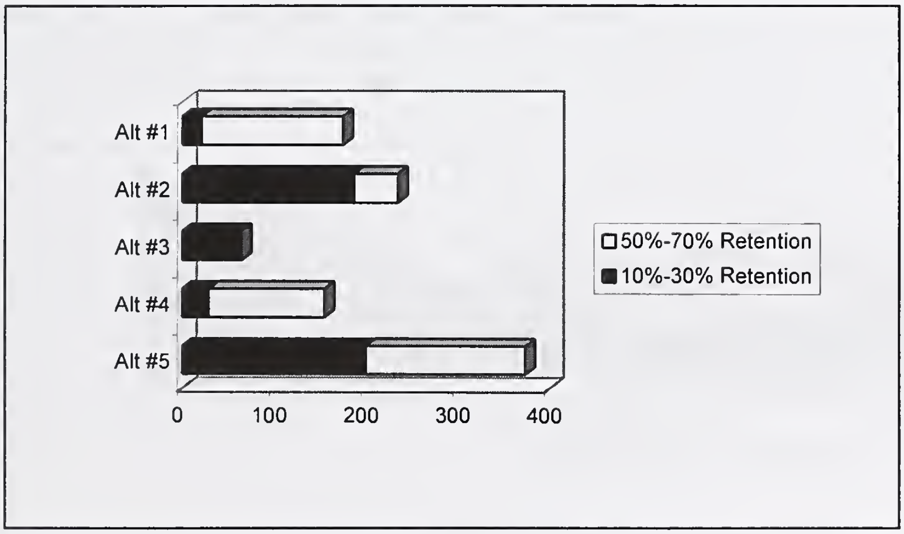
Effects of Road Construction- Only **Alternative 2** and **Alternative 5** would construct road in this viewshed. The road would be fairly low in the valley bottom and only portions of the road may be visible within Unit 26. No rockpits would be visible.

Effects of Harvest- The Table 3-2 and Figure 3-6 illustrate the relative differences between the alternatives, focusing on how we will treat the seen acres under each alternative using various methods.

Table 3-2: Seen Acres Harvested in the Stikine Strait Viewshed

Trees Retained	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
10% Trees Retained	3	47	30	3	47	0
30% Trees Retained	18	140	35	26	153	0
50% Trees Retained	66	48	0	49	97	0
70% Trees Retained	88	0	0	77	77	0
100% Trees Retained	6,152	6,092	6,262	6,172	5,953	6,327
% of Seen Acres Treated	**3%**	**4%**	**1%**	**2%**	**6&**	**0%**

Figure 3-6: Seen Acres Harvested in the Stikine Strait Viewshed



Stikine Strait Effects Summary

Alternative 6 has no detrimental effects on the visual resource since it proposes no road construction or harvest in the Stikine Strait viewshed. **All Action Alternatives** propose harvest of Unit 1 (in the Chichagof viewshed) which can partially be seen from Stikine Strait. The small patch cuts in this unit will be difficult to discern due to their small size and scattered location on an irregular, rolling landscape.

Alternatives 1, 3, and 4 have similar, insignificant effects to Stikine Strait views for different reasons. Other than Unit 1 mentioned above, Alternative 3 does not propose any

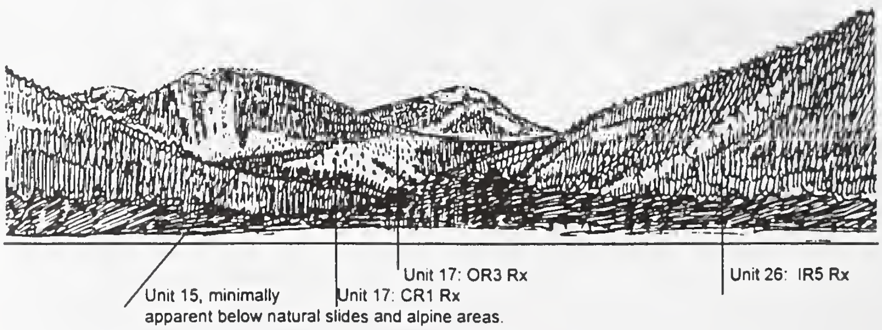
Alternatives 1, 3, and 4 have few effects on Stikine Strait views.

harvest within five miles of King George estuary. Only Unit 17 is expected to be seen in the background distance under this alternative. **Alternatives 1 and 4** do not propose harvest in the background but do propose harvest in the foreground and middleground of Red Mountain, south of the King George estuary. Unit 27 (only in Alt 1) and Unit 28 would be harvested using a combination of treatments that would leave between 50-70% of the trees in these units. These harvest units are expected to be unnoticeable to the casual marine traveler. However, there is some risk of blowdown with these partial cuts as discussed in previous sections. Under Alternatives 1, 3, and 4 the proposed harvest methods would minimize the apparent size and extent of any manipulations on the landscape.

Alternatives 2 and 5 have the greatest effect on Stikine Strait mainly due to units 25 and 26.

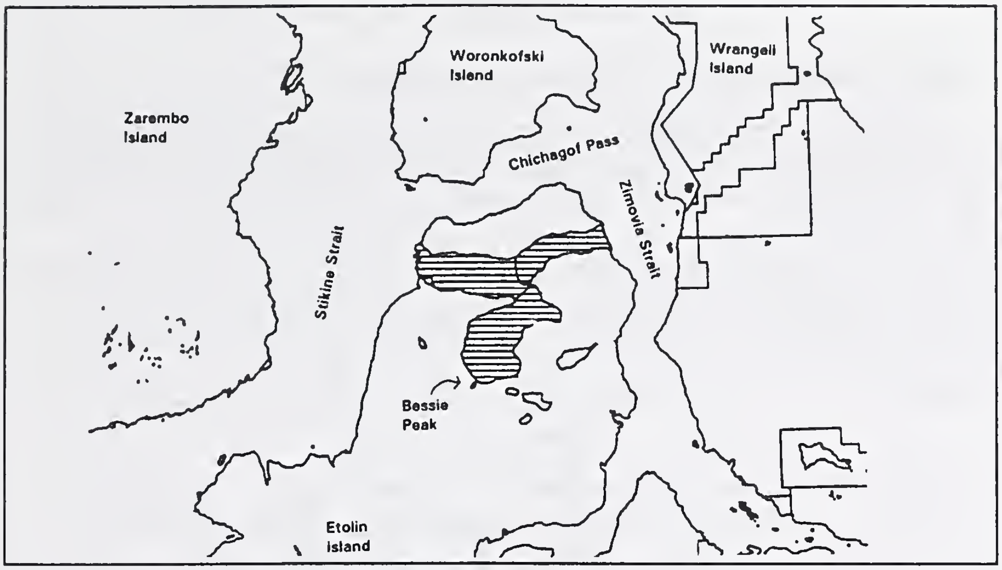
Most of the effects to the Stikine Strait viewshed would occur by implementing **Alternatives 2 and 5** . Alternative 2 would harvest the north facing slope of King George Creek with road and a combination of cable and helicopter systems. All harvest units have been designed to blend in with the surrounding landscape by feathering the edges of cuts and designing the units to look like some of the surrounding landslides. Even with these measures, Units 25 and 26 are expected to be evident to the casual observer (especially Unit 26). In addition, both alternatives also harvest Unit 17 which will be seen in the background at the head of the King George valley. Alternative 5 would also harvest Unit 28 which is expected to be unnoticeable, but does carry some risk of blowdown. Both alternatives would also have the minor effects from roading discussed above.

Figure 3-7: Alternatives 2 and 5 (Proposed Action) as seen from King George Bay



Bessie Peak Viewshed

Figure 3-8: Bessie Peak Viewshed



Bessie Peak is one of three peaks known as the 'Three Sisters' on the north end of Etolin Island. Bessie Peak, which lies furthest to the north of the group, is 3,915 feet high. Along the same ridge line, but further to the southeast, is Helen Peak which is 3,856 feet in elevation. The third sister, Virginia Peak, is 3,760 feet high and lies further to the southeast, just above Anita Bay. Currently, recreational use of areas inland from the beaches is low and focuses on a corridor to the alpine country including Red Mountain, Bessie Peak, Virginia Peak, and Helen Peak. These peaks have been used over the years as mountaineering objectives, as well as remote deer hunting areas. During the Wrangell District Recreation goal setting process and public comment on this timber sale, some suggested that further development of the Bessie Peak trail could occur in the future to make it more accessible to tourists, including the suggestion to create a high country trail and series of huts. Public comments indicated that some people do use this area for recreation and visit Bessie Peak, which overlooks much of the study area. For this reason, we have chosen to display the effects of the harvest alternatives to the views from Bessie Peak.

Under action alternatives, views from Bessie Peak are somewhat mitigated by partial cuts and the shape of the harvest units.

From Bessie Peak, one can look west to Red Mountain and Stikine Strait, north to Honeymoon Creek drainage, and south to Helen Peak. We have included Lower King George South Facing, Honeymoon South Facing, and Upper King George Land Units in this viewshed of approximately 6,000 acres, as they are the most visible land units to someone on Bessie Peak. The entire acreage of these land units is not visible, but the majority of the acres in these land units can be seen, therefore providing us with a relative indicator of the differences among alternatives.

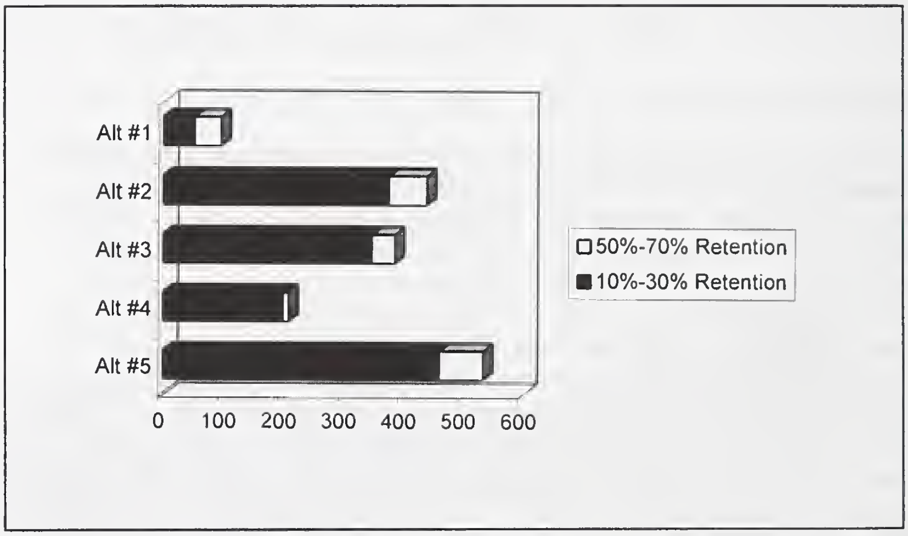
Bessie Peak Effects

Table 3-3 and Figure 3-9 illustrate the relative differences between the alternatives in relation to the view one might see from Bessie Peak.

Table 3-3: Acres Harvested in the Bessie Peak Viewshed

Trees Retained	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
10% Trees Retained	45	291	292	133	330	0
30% Trees Retained	5	83	54	65	129	0
50% Trees Retained	29	64	39	9	73	0
70% Trees Retained	16	0	0	1	1	0
100% Trees Retained	5,845	5,502	5,555	5,732	5,407	5,940
% of Seen Acres Treated	**2%**	**7%**	**6%**	**4%**	**9%**	**0%**

Figure 3-9: Acres Harvested in the Bessie Peak Viewshed



Of the action alternatives, Alternative 4 has the least effect on views from Bessie Peak.

Alternatives 1 and 6 would have the least detrimental effect on views from Bessie Peak. No harvest units would be visible under Alternative 6 and less than 100 acres of harvest would be seen in the distance under Alternative 1. Unit 27 in Alternative 1 is located on the ridge that hikers use to access the peak but harvest along this access corridor would retain 70% of the trees and would open up some views of the surrounding landscape to hikers. This may have an overall positive effect as long as the route is kept free of logging slash. Both of these alternatives would maintain the natural condition of the Bessie viewshed.

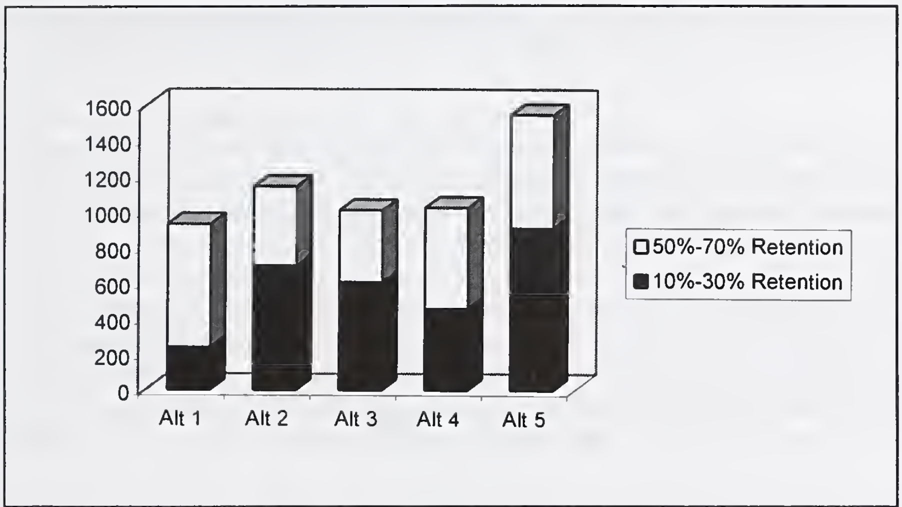
Alternative 4 would not maintain the natural condition, but would have lower detrimental effects on views from Bessie Peak, compared to Alternatives 2, 3 and 5. Units 13, 14 and 15 and their associated roads would be most visible but are designed to mimic the shape of landslides and would be 3-4 miles away.

The rest of the alternatives have similar effect on views from Bessie Peak. In addition to harvest in Honeymoon Creek, **Alternative 3** would road and harvest Units 17 and 19-22 directly below Bessie Peak as close as 2 miles away. Most of these harvest units, except Unit 19, would be noticeable even though they are designed with irregular boundaries and leave 10-30% trees along the edges or as islands in harvest units.

Alternatives 2 and 5 have the greatest effect due to units 17 through 22.

Alternatives 2 and 5 have similar effects. In addition to the harvest units mentioned above, both alternatives also harvest Unit 18. The top portion of this unit may be seen from Bessie Peak. These two alternatives also propose more roading and one additional rock pit that would be visible from the peak. Neither alternative proposes roading or harvest on the ridge used by hikers to access the peak.

Figure 3-10: Visible Acres Harvested, Including All Four Viewsheds



Cumulative Effects on Scenery

Cumulative effects must take into account past, proposed, and foreseeable future harvest of an area. The cumulative visual effects of the proposed King George timber sale differ, depending on where you are viewing the area from, and in what context (are you traveling on the ferry up Stikine Strait, or seeing the area from your living room window on Zimovia Highway?). From the Zimovia Strait Viewshed, this sale would add to the effects left from the Starfish Sale near Anita Bay, as well as those past harvest units on Wrangell Island. In only looking at the portion of the Zimovia Strait Viewshed which is viewed from Zimovia Highway, this sale would add to the visual effects left behind from beach logging on Etolin and Woronkofski Islands (depending on the alternative chosen). From the Chichagof Pass Viewshed, the only other evidence of harvest is on Woronkofski Island, though harvest units on Zarembo Island can be viewed far in the background on a clear day. The Stikine Strait Viewshed will be affected by adding to the effects of harvest from the Granite and Quiet timber sales (near the Big Bend area), as well as harvest units on Zarembo Island. From the Bessie Peak Viewshed, the cumulative visual effects will be limited to the activities proposed in the King George Study Area. There are no other timber sales proposed over the next ten years on the north end of Etolin Island. There are sales proposed over the next ten years south of Anita Bay but these sales would involve other viewsheds and travel routes.

Recreation Resources

Recreation use in the King George Study Area is very dispersed. A small amount of use occurs in association with alpine hiking, as people visiting the alpine country often access Bessie Peak by starting their hike at King George Bay. Due to the area's close proximity to Wrangell, many people use the beaches for picnicking and other day use activities, especially near the mouth of Honeymoon Creek and the King George Bay estuary. Most of the interior of the study area is seldom used.

Most recreation takes place on the beaches, or from boating near King George Bay and Honeymoon Creek.

Although use levels are low, results from public scoping indicate that many people are concerned with how timber harvesting may affect the area. In 1991, the Wrangell District initiated a broad public scoping effort to identify possible recreation developments. Results from that effort show that there is wide support for the development of a high country hiking trail with associated shelters or cabins on North Etolin Island. Additionally, public scoping associated with the King George Timber Sale resulted in many concerns for the recreation potential of this area. Examples of public response include:

"...I feel the undeveloped recreational attractions of the area would best be maintained if no timber harvest was done in this study area. The King George area in particular is used by hikers, fishermen after both trout and salmon, people picnicking along beaches, hunters, as well as many other users of the area..."

"...with limited harvest this area will draw visitors who will spend dollars while visiting Wrangell, as well as to have marine transporters or guides take them to King George and trailhead (to the alpine country)...timber can be found in many places throughout the Tongass National Forest that have far less recreation opportunities to boast about. The King George area should be protected like the fine gem that it is..."

"...we believe the scope of logging planned is excessive and does not balance well against the recreational use of the area..."

"...North Etolin Island is one of the only remaining areas close to Wrangell that is, for the most part, uncut. It is an ideal area for recreation. King George and Honeymoon Creek provide excellent locations for camping, picnicking, hiking and fishing. I believe road building and logging will have a devastating effect on the area's recreational potential..."

"..we fully support a Forest Service project to build trails and cabins in the area, but a timber sale of the magnitude you're discussing would make a mess of the area and consequently any hope of developing the area for recreation or tourism..."

"...roads and clearcuts, even if they provide easier access to the higher country, must not be considered "access improvements." They are, rather, unfortunate eyesores one would end up having to go through in order to reach the good parts..."

The public scoping effort also resulted in some comments in favor of the timber sale, including:

"...the roads proposed would open more land for public recreation and the ability for the average family to access this area in terms of hunting, hiking and just general recreation..."

" I think it would be o.k. to leave the roads open after logging as they will never be tied to any main line systems..."

"...the area encompassing Red/Helen/Virginia/Bessie is the most outstanding alpine country outside Wilderness on the Wrangell District...this area is one of our prime opportunities for recreational developments for this type of activity. A road system could allow for an easier route to Bessie etc...."

Other uses

Outfitter and guide use in the King George Study Area is low. There are currently 5 temporary permits for outfitting and guiding on Etolin Island including such uses as: big game hunting, sport fishing, sightseeing, hiking, and steelhead fishing. Although outfitters and guides are permitted to conduct these activities throughout Etolin Island, yearly reports from outfitters and guides indicate that the study area is not often used for commercial recreation activities.

Effects on Natural Setting

Any timber harvest in the area would change the character of this area for recreation. The natural setting is effected by the change in scenery in areas where people are accustomed to recreating. The alternatives differ in their degree of change. In general, any harvest in the interior of the study area (Alternatives 2, 3, 4 and 5) would change the experience for anyone hiking into the alpine country as views of the harvest units will detract from the natural landscape. Although the effects to scenery are important to the overall recreation experience, other important components include the social and managerial setting.

Effects on Social and Managerial Setting

Recreational beach use at the mouth of streams will not be affected.

Recreational beach use at the mouth of Honeymoon and in the King George estuary will not be directly affected by this timber sale. Four alternatives (Alternatives 2, 3, 4 and 5) propose an LTF just north of the mouth of Honeymoon Creek. Although the anchorage there will not be improved, the LTF and associated road system may attract boaters.

Roads will invite use. Closing roads to motorized use will favor hiking or biking.

Roaded access will likely bring more people into the area, especially hunters. Those alternatives that allow access by motorized vehicles after the sale closes (Alternatives 2, 3, and 4) would attract more use than those that leave roads in place, but close them to motorized vehicle access (Alternative 5). Closing roads to motorized vehicles would be beneficial to those users seeking improved access without the chance of running into motorized recreational vehicles (people engaged in cross country skiing/mountain biking/hiking, etc.). Those alternatives that propose roads, whether they are open or closed, (Alternatives 2, 3, 4 and 5) could attract more use to the alpine area surrounding Bessie Peak by providing shorter access routes to that area. Table 3-4 displays the miles of road that would be built in each land unit, by alternative:

Table 3-4: Road Miles by Land Unit

	Honeymoon Land Unit	King George Land Unit	Zimovia Face Land Unit	Grand Total
Alt 1	0	0	0	**0**
Alt 2	3.75	7.05	0	**10.80**
Alt 3	3.51	4.16	0	**7.67**
Alt 4	4.12	0.73	0.43	**5.28**
Alt 5	4.12	7.05	1.49	**12.66**
Alt 6	0	0	0	**0**

We are looking for comments on which roads should be kept open, and which ones should be closed.

It is important to note here that the road management strategies presented in the alternatives are shown to illustrate the different strategies the Forest Service may take in managing road access after the timber is removed. However, any road management strategy can be attached to any alternative. For example, the current road management strategy in Alternative 5 is to close all roads to motorized traffic after harvest. The decision maker could, however, choose Alternative 5 but change the road management strategy to that proposed in Alternative 3 (provide motorized access from the LTF to Unit 20, with roads beyond Unit 20 having non-motorized access only). Because these road management strategies are not necessarily 'attached' to the alternatives, it is important that you let us know which strategies you like best, and why.

Alternative 1 and Alternative 6 (No Action Alternative) are not likely to change the recreational use of the area. Alternative 1 would change the recreation experience for users viewing the area from the water or Wrangell Island, but does not propose to change the existing access to the study area.

Alternative 1

Alternative 1 proposes to harvest units on the exterior of the study area. No roads would be constructed in this alternative. Beach use around the study area should not be directly affected by this alternative. An LTF would not be built, so the potential to attract additional beach use in this area would not exist. Without roads, access to the area would not be improved, and thus would not change.

People recreating on the waters surrounding the study area and on Wrangell Island would have views of harvested units which may detract from their recreation experience. People accessing the alpine country would likely continue to use King George Bay as the primary starting point. If this alternative is chosen, hikers would traverse through Harvest Unit 27 to reach the peak. They would not likely be able to view harvest units from the top of Bessie Peak, or from much of the alpine ridge route to the peak.

Alternative 2

Alternative 2 proposes to harvest units along Chichagof Pass and in the interior of the study area. The road management strategy is to leave the main road open to motorized vehicle traffic from the LTF to Unit 17, then limiting access past that point to non-motorized vehicles. The LTF may attract additional saltwater related beach use of the area. Motorized access may attract the use of passenger vehicles or 4 wheelers, especially during the hunting season. Additionally, the LTF may become a drop-off point for hikers,

cross country skiers or mountain bikers. People who want easier access to the area than currently exists, without interacting with motorized vehicles, would find that opportunity on the road system past Unit 17. People wishing to access the alpine country may find the motorized access to Unit 17, or the mountain bike/hiking access to Unit 22, appealing as an easier "jumping off point" than currently exists.

People recreating on the waters north and west of the study area may be able to view harvest units which could detract from their recreation experience. People recreating on Wrangell Island would not be able to see harvest units except oblique views of Chichagof Face. People accessing the alpine country would see harvest units from Bessie Peak, as well as from many points on their trip to the top.

Alternative 3

Alternative 3 provides the most opportunity for motorized recreation use.

Alternative 3 proposes harvest units on the exterior of the study area facing Chichagof Pass and a small amount of harvest facing Wrangell Island (Unit 6). The interior of the study area would contain harvest units, as well. The road management strategy for this alternative is to provide motorized access from the LTF to Unit 20. Roads beyond Unit 20 would be restricted to non-motorized access. This alternative provides the most opportunity for motorized recreation use and may attract passenger vehicle and 4 wheeler traffic, especially during the hunting season. Drop-off recreation use by mountain bikers, cross country skiers, hikers, and other non-motorized recreationists may become established. However, the potential of interaction between non-motorized and motorized vehicle users can be expected (except a short distance of road past Unit 20 and spur roads). People wishing to access the alpine may find motorized access to Unit 17 and walk-in access to Unit 22 appealing.

Recreationists on the waters north and east of the study area may have views of harvest units which may detract from their recreation experience. People recreating on the waters near King George Bay would only see Unit 1. As there is no harvest proposed in the Lower King George or Red Mountain Land Units, views of those areas would not be affected. People accessing the alpine country would view harvest units both from the peak and along the trip to the top.

Alternative 4

Alternative 4 would provide for motorized access to Honeymoon Pass.

Alternative 4 proposes harvest units along the exterior of the study area and in the Honeymoon Land Unit. The road management strategy for this alternative is to leave the road open to motorized vehicle traffic, but proposes the shortest amount of road to be constructed (of the roaded alternatives). The LTF may attract additional beach/saltwater use to that area, and may encourage drop-off use of motorized and non-motorized vehicles for recreational use. People wishing to access the alpine country would likely continue to use King George Bay as a "jumping off point," but may be attracted to the road system as an easier starting point, just past Unit 15.

People recreating on the waters surrounding the study area would have views of harvest areas from the west, north and east which may detract from their recreation experience. People accessing the alpine country would have limited, oblique views of harvest units from the top, and would view some evidence of harvest along the way up if they choose to use the road system as a starting point.

Alternative 5

Alternative 5 (the Proposed Action for timber harvesting) would result in logging both the outside and interior of the study area. The proposed road management for this alternative would result in closing all road segments to motorized vehicle traffic. The proposed LTF may attract beach users to that area, but would not improve the overnight anchorage there. The existence of a road system close to Wrangell may increase the potential for drop-off recreation for mountain bikes, hikers, and cross country skiers. Motorized vehicles would not be allowed after the sale is closed. This may make the area more attractive to people who are seeking easier access to the area (roadbeds), but do not wish to interact with motorized vehicles. Access to the alpine area may be improved near Harvest Units 17, 22, and 26. People who may not have ventured into the alpine country previously due to the physical demands of the terrain may find the idea more appealing with access to "easier routes."

People recreating on the waters surrounding the study area or on Wrangell Island would be able to view harvested areas, which may detract from their recreation experience. Likewise, people hiking in the Bessie Peak area would view harvested units throughout most of their hike to the top as well as once they reach the summit.

Alternative 6

Alternative 6 (the No Action Alternative) proposes to leave the study area in its current condition. Access would not be improved, and recreation values as they exist now would be maintained. People recreating on the waters surrounding the study area and on Wrangell Island would not view harvest units in this area. This alternative would likely be appealing to those supporting the use of the King George as an undeveloped recreation attraction close to Wrangell. The alpine country is the largest potential drawing card for this area. Leaving the area as it is would allow for the future development of the often mentioned high country trail or hut-to-hut system. Under this alternative, the trail and hut-to-hut system could pass through and offer views of undeveloped country.

Cumulative Effects on Recreation Resources

There are no other timber sales proposed over the next ten years on the north end of Etolin Island. The potential King George Sale and the past harvest in Anita Bay and Quiet Harbor are the only sales in this area and there are no other planned actions which would have a detrimental effect to recreation resources. There are sales proposed over the next ten years south of Anita Bay but these sales would involve other recreation areas and travel routes. Therefore, the effects disclosed by the previous section encompass all past and reasonably foreseeable effects to recreation resources on North Etolin Island.

Issue Two: Timber Sale Economics and Road Management

"Please expedite this sale and select the alternative which provides the greatest volume of timber. Our timber industry and the economy of our district depends on sales such as this one in the King George area."

"We need to learn more about how small and large operators work. Why do you plan for future entries...?"

"I would like to propose that you address the issue of the value of jobs and economic stability for the people of Wrangell and Southeast Alaska. While I'm sure we would all agree that scenic and recreational values are important to people, we would also have to agree that without jobs and economic stability, the same people will not be able to enjoy the other values the King George area has to offer."

"This sale should not be characterized as being of economic benefit to Wrangell when the likelihood is that it will be left with 1,200 acres of harvested forest on its front doorstep and very little else to show for it."

"The planning for this sale has suggested new approaches to timber harvest that are very encouraging from a wildlife manager's point of view. We hope that in the end, these new approaches will be adopted and that the project decision will be based on more than the timber target or the economic bottom line."

"The roads proposed would open more land for public recreation and the ability of the average family to access this area for hunting, hiking and just general recreation."

"Road access is detrimental to wolves, bears and marten. Roads need to be closed after logging. If roads must remain in service, then use of them needs to be restricted to mitigate adverse effects on wildlife."

One of the key issues is how much we should harvest now, versus save for the future.

The above comments reflect the range of opinions on the factors affecting sale economics and its relative importance when compared to other issues. We have responded to the above concerns by designing a range of alternatives which are all economically feasible, yet responsive to environmental issues (Alternative 2 can be made feasible if the road is constructed on the north side). The short-term economics of getting the timber out is different than the long-term economics of a sustained harvest level and greatest efficiency over time. Even though we are making a short-term decision, the first harvest entry must be responsive to long-term needs and issues. The biggest tradeoff between alternatives is the rate of harvest over time compared to the cost and value of the transportation system (roads, helicopters and log transfer site). Alternative 5 would log most of the accessible and economic areas in the project area in the next 5 years but must also support the greatest amount of roading to do so. Maintaining this road over time, without income from future sales would be difficult. At the other end of the spectrum, Alternative 1 harvests with a helicopter, constructs no roads and is the least cost to implement. This alternative forgoes development of a transportation system and this will affect the feasibility of possible future small or large sales. By concentrating harvest in different areas, the other alternatives leave some areas available for the future, while developing some of the infrastructure. Thus, the range of alternatives illustrates the biggest issue surrounding harvest economics in the King George area; If we log, how much should we take now versus save for the future?.

Also discussed in this section, are the issues surrounding regional and local economic benefits and the cost or benefits of closing roads or keeping them open.

Regional and Local Economic Benefits

The communities of Southeast Alaska depend on the Tongass National Forest to provide the foundation for one or more natural resource based industries including: wood products, commercial fishing and fish processing, tourism and commercial recreation, mining, and mineral development. Many residents also depend heavily on subsistence hunting and fishing to meet their basic needs. Government, transportation service and educational services are also significant regional income sources.

Table 3-5. Southeast Alaska Wage and Salary Employment 1994 and 1996 Forecast
Annual Average Employment

	1994	1996	Gain/Loss
Goods Producing	**5,850**	**5,550**	**-300**
Mining	150	225	+75
Construction	1,550	1,525	-25
Manufacturing	4,150	3,800	-350
Seafood Processing	*(1,650)*	*(1,525)*	*(-125)*
Forest Products	*(2,200)*	*(1,950)*	*(-250)*
Service Producing	**29,400**	**30,000**	**+600**
Transportation	2,900	2,975	+75
Trade	6,550	6,750	+200
Wholesale	*(550)*	*(550)*	*(0)*
Retail	*(6,000)*	*(6,200)*	*(+200)*
Finance, Insurance, Real Estate	1,450	1,600	+150
Services and Misc.	6,200	6,575	+375
Government	12,300	12,100	-200
Federal	*(2,000)*	*(1,950)*	*(-50)*
State	*(5,350)*	*(5,250)*	*(-100)*
Local	*(4,950)*	*(4,900)*	*(-50)*
Total	**35,250**	**35,550**	**+300**

Source: Alaska Economic Trends, Alaska Department of Labor, May 1995.

A mixture of employment growth and decline is projected for Southeast Alaska. Gains are expected in the mining industry following the reopening of the Greens Creek mine on Admiralty Island and construction employment is expected to increase in response to a number of residential and public works projects. The number of visitors to Southeast Alaska continues to increase, resulting in increased employment in the services and retail trade sectors. The gains in these industries are expected to be tempered by the effects of the Wrangell mill closure and reduced logging activity. Decreasing budgets are expected to lead to job cuts in the government sector. A new individual fishing quota system for some species is expected to reduce the number of seasonal and short term processing and fishing crew positions.

The wood products industry has been an integral part of the regional economy of Southeast Alaska since the 1950's. From 1981 through 1994, the industry provided direct employment to an average of 2,704 workers, and indirect jobs for an additional 1,890 people. Recent employment in the timber industry of Southeast Alaska for 1987-1994 is listed below in Table 3-6.

Table 3-6. Jobs Produced in the Timber Industry Since 1987

Type of Jobs	1987	1988	1989	1990	1991	1992	1993	1994	Jobs/ MMBF
Logging	1,545	1,981	2,113	2,144	1,554	1,415	1,344	1,177	2.30
Sawmill	375	468	478	500	604	538	447	515	1.01
Pulpmill	861	892	925	899	911	910	859	533	1.04
Direct	2,781	3,341	3,516	3,543	3,069	2,863	2,650	2,225	4.35
Indirect	1,950	2,350	2,550	2,570	2,226	2,077	1,935	1,624	3.18
Total	**4,731**	**5,691**	**6,066**	**6,113**	**5,295**	**4,940**	**4,585**	**3,849**	**7.53**

Source: Timber Supply and Demand 1994, USDA Forest Service, March 1995.

The annual demand for timber in Southeast Alaska is determined by the cost of timber offered for sale, the number and capacity of wood processors in operation, the market value of the products manufactured, the competitive position of Alaska's producers in world markets, and the currency exchange rate with wood importing nations.

Wood products manufacturers operating in Southeast Alaska in 1994 had an installed mill capacity to process approximately 519 MMBF. Total wood consumption was 359 MMBF in 1994.

Despite record lumber prices in 1994, Alaska Pulp Corporation closed its Wrangell sawmill indefinitely on December 1, 1994. The sawmill, with an installed capacity of 110 MMBF per year, was operating at approximately 69% of capacity prior to shutdown. Although APC has offered to sell the mill, at least one prospective purchaser has declined to purchase it, citing the lack of certainty in Tongass timber supply as one of the reasons.

There are essentially three sources of timber for processors in Southeast Alaska: 1) the Tongass National Forest, 2) Native-owned timberlands, and 3) State timberlands. Import of Canadian logs has declined to near zero for the past several years due to reduced supply and rising selling values for Canadian pulp logs.

The State's timber program in Southeast is relatively small, with an average annual harvest of 9 MMBF over the past five years, with a high of 21 MMBF in 1994 . Harvest from Native timberland peaked in 1989 at 532 MMBF, declining to 215 MMBF in 1994. Timber harvest from the Tongass reached its peak in 1990 at 461 MMBF, declining to a 10 year low of 276 MMBF in 1994. Harvest on all ownerships in Southeast Alaska for 1994 was 511 MMBF. (Timber Supply and Demand 1994.) Currently, in-State processing restrictions only apply to timber harvested from federal lands . Because export market prices greatly exceed those paid by local manufacturers, all but the lowest quality Private and State timber is sold overseas. Thus the bulk of the wood actually processed in Southeast Alaska comes from the Tongass National Forest.

The King George Study Area will not produce enough timber volume by itself to encourage investment in new facilities, or re-opening of the Wrangell sawmill. However it plays a role as part of the overall Tongass National Forest sale offering for fiscal year 1996 in helping meet in-State processing demands and retain existing employment levels.

Temporary jobs available in the Wrangell area could range from 32-60 as a result of this sale.

Temporary jobs in the Wrangell area as a result of this sale range from 32-60, in potential direct jobs from logging during the life of the sale lasting from 2-5 years. Some of the loggers could be Wrangell residents. Depending on the sale offered, and the purchaser who bids the highest price, some of the logs could be processed in Wrangell, increasing the potential number of jobs. However, hiring practices and processing location is not something we can control.

Market Values and Costs of Each Alternative

Economic analysis is useful in comparing the economic efficiency of alternatives in the King George timber sale. The economic analysis will provide needed information to make informed economic decisions in implementing the Forest Plan. Current Forest Service Handbook direction (USDA FSH 2409.18) recommends a mid-market assessment to compare benefits and costs of proposed timber sale project alternatives. Determining if King George will be an economical offering was analyzed by subtracting road construction, transportation costs and logging costs, from the log value for each alternative. Because of the different management prescriptions, species mixes, volume per acre, mobilization costs and harvest methods, the log selling value will vary for each alternative. This analysis will use a ten year average for end product selling values (adjusted for inflation) to account for market fluctuations. The results of the mid-market assessment and relative economic ranking of each alternative are displayed in Table 3-7. Results from the mid-market analysis are used as a comparison of the alternatives to evaluate cost differences. Since the timber market has been changing rapidly as of late, the actual stumpage rate may change by the time the timber sale appraisal is completed. The final appraisal will include current quarter selling values, cost information, and a normal profit and risk margin using an operation of average efficiency.

Table 3-7 . Economic Comparisons of Timber Values to an Operator of Average Efficiency

Economic Factor	**Alt 1**	**Alt 2**	**Alt 2 North Road**	**Alt 3**	**Alt 4**	**Alt 5**	**Alt 6**
Total Volume (MBF)	14,060	19,500	19,500	16,700	16,170	26,640	0
Selling Value ($/MBF	$371	$372	$372	$372	$371	$373	$0
Cost ($/MBF)							
Stump to Truck.................	$226	$168	$168	$172	$191	$165	$0
Transportation..................	55	47	47	46	48	47	0
General Logging Overhead.....................	11	11	11	11	11	11	0
Temporary Development................	4	7	7	9	6	6	0
Specified Road Cost..........	0	96	91	75	56	81	0
Logging Profit and Risk (60%)	52	46	47	47	48	47	0
Total Costs	$348	$375	$371	$360	$360	$357	$0
Net Stumpage ($/MBF)	**$23**	**-$3**	**$1**	**$12**	**$11**	**$16**	**$0**

Volume estimates included in each alternative include utility and road right-of-way, which will be cut during road construction for the roaded alternatives. Positive net

stumpage values generally indicate a viable alternative. Stumpage values are approximations based on middle market analysis and not current or future values. The middle market analysis indicates that Alternative 2 may be an uneconomic offering under the criteria used. The primary reason for this is the higher specified road cost associated with constructing the mainline road on the south side of the Honeymoon drainage, which is located primarily through open muskeg. While there would be a reduced cost for felling right-of-way timber for this road location, the increased cost of extra rock can raise the cost of building on muskeg by 25%. Locating the mainline road system on the north side of Honeymoon creek would reduce the specified road construction costs per MBF significantly. The result would be a positive net stumpage value of $1. The road on the south side was considered in the range of alternatives because of the potential values to freshwater systems (Issue 3) and habitat conservation (Issue 4).

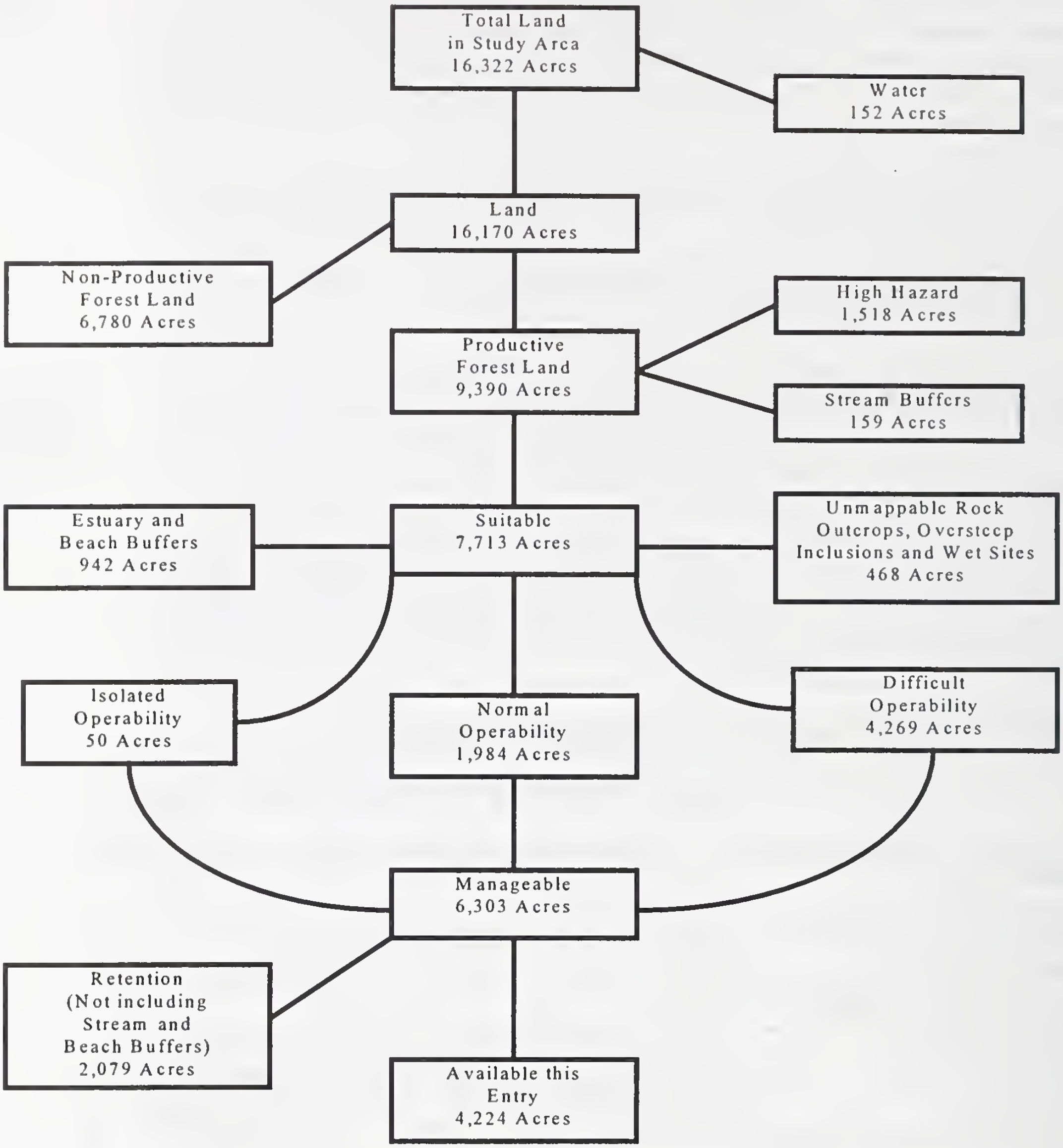
The net stumpage value is highest for Alternative 1. While the logging costs for this helicopter alternative are substantially higher than other alternatives, the lack of specified road development is the largest contributing factor to the high positive midmarket stumpage. The proposed action, which has the second highest indicated stumpage value, would construct the most road system (12.7 total miles) and harvest the most volume of all action alternatives. Alternatives 3 and 4 have similar net stumpage values but different means of arriving at near the same value. Alternative 3 is middle of the road for almost all cost centers, while Alternative 4 has the second highest logging costs of all alternatives (due to substantial proportion of helicopter volume) coupled with the lowest specified road costs of the roaded alternatives.

The net, mid-market stumpage value is greatest for Alternative 1.

Table 3-8. Alternative Summary for the King George Study Area

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6 No Action
Timber Harvest						
Manageable Acres Available	6303	6303	6303	6303	6303	6303
Proposed Treatment Acres	888	968	894	943	1356	0
% of Manageable Treated	14%	15%	14%	15%	22%	0%
Harvest Volume (MBF)						
Cable Volume	0	9,300	7,450	4,040	12,580	0
Helicopter Volume	14,060	10,200	9,250	12,130	14,060	0
Total Volume	14,060	19,500	16,700	16,170	26,640	0
Road Construction Miles						
Specified Road	0	9.8	6.6	4.8	12.4	0
Spur Road	0	1.0	1.1	.5	1.3	0
Total Road Miles	0	10.8	7.7	5.3	12.7	0

Figure 3-11, Acreage Classification for the King George Study Area



There are approximately 16,322 acres within the study area. Of this, 152 acres are water, estuaries, or tide flats. Most of the acreage computations are based on the remaining 16,170 acres.

- Non-productive forest land includes areas of bare rock, alpine meadows, muskeg wetlands and soils that only support scrub timber
- High hazard soils are areas that pose a high risk of mass failure due to steep slope, soil type, drainage ability or other factors.
- Stream buffers are required on all Class I and Class II streams.
- Current management direction on the Tongass requires a 500 foot beach buffer and 1000 foot estuary buffer.

The suitable acres have been pared down to what we call manageable acres, which accounts for unmappable rock outcrops, inclusions of oversteepened slopes, and poorly drained sites within larger stands.

Figure 3-12, Suitability and Operability

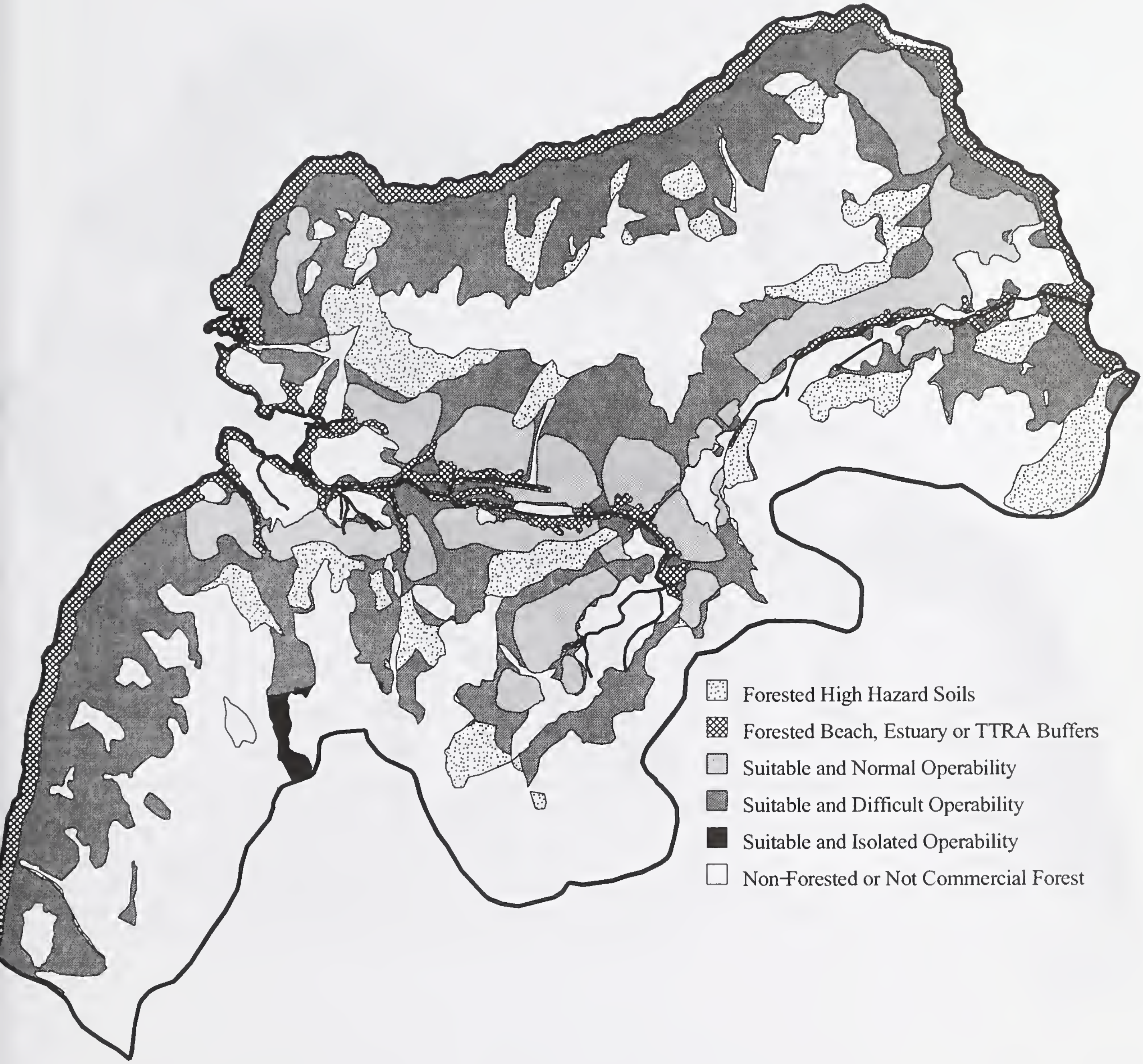
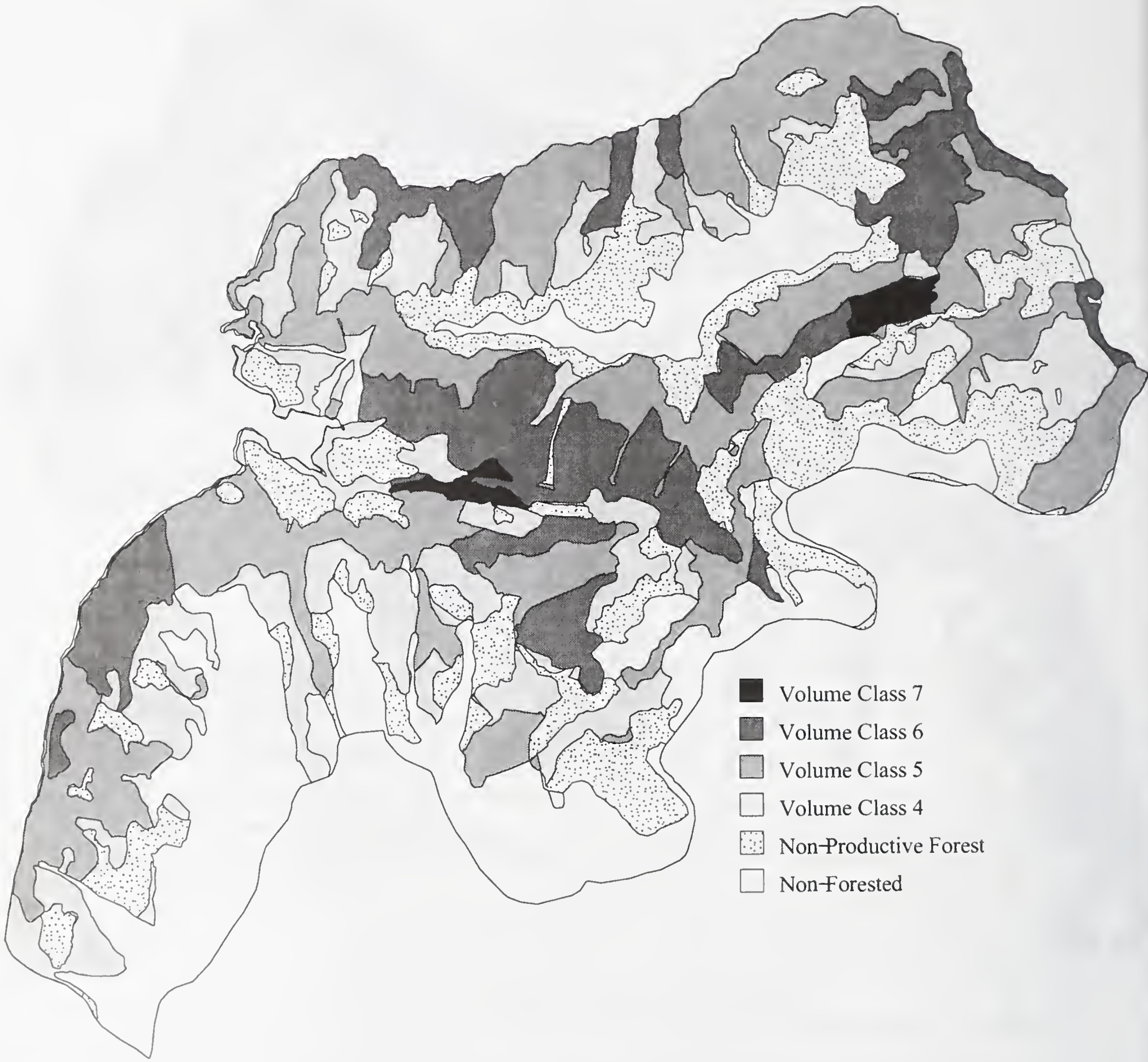


Figure 3-13, Timber Volume Classes



Capability to Offer Small and Large Sales

Alternatives 1 and 6 offer no potential volume to smaller operators.

The Forest Supervisor will decide which alternative to implement given the environmental effects disclosed in this document. Deciding how many sales to sell from a given alternative is an administrative decision made after an alternative is selected. However, due to the interest in this issue, we have disclosed the inherent potential of each alternative to be divided among large and small sales in the next 5 years. A small sale is considered to be less than 1 MMBF in size. Smaller operators generally favor harvest with simple cable, or ground-based systems easily logged from existing roads often built by larger sales. Several cable units within the King George study area are well suited for potential offer as small sales, including units 6, 10, 11, 12, 15, 20, 23 and 24. The following table shows which potential small sale units are included in the analysis for each alternative and could be directly accessed by the road system planned for that alternative. Alternative 1 would not offer easily accessed volume to smaller operators and would not access future sales because it builds no road. Alternative 6 does not offer any volume to either large or small operators.

Table 3-9. Potential for Small Sales Offer by Alternative

Unit	Acres	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
6	32	No	No	Yes	Yes	Yes	No
10	17	No	No	No	Yes	Yes	No
11	7	No	No	Yes	Yes	Yes	No
12	6	No	No	Yes	Yes	Yes	No
15	14	No	Yes	Yes	Yes	Yes	No
20	16	No	Yes	Yes	No	Yes	No
23	19	No	Yes	No	No	Yes	No
24	11	No	Yes	No	No	Yes	No
Total Area	*Acres*	**0**	**60**	**75**	**76**	**122**	**0**
Total Volume	*MBF*	**0**	**1,590**	**2,007**	**2,177**	**3,500**	**0**

Alternative 5 has the greatest potential to be divided among large and small operators.

In addition to the potential small sales listed above, the road system established for each alternative would access various areas of commercial forest land for possible future small or large sales. Such sales would require further environmental analysis and disclosure under NEPA. The information is provided here so that you can see the relative differences in each alternative's ability to access future timber by developing a road system under this sale. The following table compares the acres of suitable forest land that would have access improved by the road system built for each alternative.

Table 3-10. Forested Acres With Access Improved by Roading Under Each Alternative

	Improved Normal Operability Access	Improved Difficult Operability Access	Improved Access Acres Available	Total Improved Acres Harvested	Improved Access Acres Remaining
Alt 1	0	0	0	0	0
Alt 2	805	1,483	2,283	553	1,730
Alt 2 (N.Road)	932	1,561	2,493	553	1,940
Alt 3	718	953	1,671	453	1,218
Alt 4	440	709	1,149	273	876
Alt 5	1,296	1,770	3,066	756	2,310
Alt 6	0	0	0	0	0

Market and Non-Market Benefits of Maintaining or Closing Proposed Roads

The above table displays the possible future benefits of road construction. Maintaining this road system for motorized use after the sale is logged has both economic and environmental costs. If the road is going to be used again in the near future, the benefits of keeping it open may be high. Even if a road is closed, some roads will need to be maintained to some degree in order to keep culverts functioning so that blockages do not occur that would result in washouts and sedimentation problems. Some road closures may have benefits to people who prefer non-motorized recreation but can still take advantage of improved access. Some of the greatest benefits of road closures can be to wildlife, since hunting success and disturbance is generally less. The tables below summarize the tradeoffs of various portions of road proposed under each alternative. More information about each segment is available on the road cards in Appendix B.

Honeymoon North Road (Segments 1 and 2)

Benefits of keeping the Honeymoon road open include access for recreation, small sales, and stream crossing maintenance. Restricting access would benefit wildlife.

Road segments 1 and 2 make up the backbone of the road network for most alternatives, starting from the log transfer site north of Honeymoon Creek and extending to the pass that separates the King George Creek watershed from the Honeymoon Creek watershed. **Alternatives 3 & 4** keep the road open. **Alternative 5** would maintain the road for five years following harvest to conduct planting, harvest any possible blowdown that might occur or sell possible small sales. Then roads would be closed to all motorized traffic to reduce impacts on wildlife and minimize road maintenance costs. Periodic maintenance would still be needed to reduce the risk of drainage structures failing. **Alternatives 1 and 6** would not construct this segment.

Table 3-11: Effects of Road Development and Maintenance, Segments 1 and 2

Issue	Effects of Road Segments 1 & 2
Scenic and Recreation	Provides improved access for hiking, biking, or motorized use to the central portions of the study area, including partial access to the pass to Kunk Lake. Keeping it open would favor motorized use while motorized closure would benefit hikers and bikers.

Economics	Provides the mainline road through Honeymoon Creek which is required to economically harvest timber in the interior of the study area. Keeping the road open would help reduce costs of possible future management activities.
Freshwater System	Portions cross several Class II and III streams that pose a moderate risk of debris accumulation in culverts which may lead to wash-outs. Oversizing culverts and regular maintenance will minimize risk.
Habitat Conservation	Bisects areas of old growth habitat and minimizes habitat effectiveness of the surrounding forest. Improved access may increase harvest of some game species and furbearers in central portion of the study area. Restricting access to walk-in travel would benefit habitat values. Road ends at the Honeymoon pass which is a concentrated wildlife corridor.
Cost of Maintenance	If the road were kept open to motorized use, the cost of maintenance is $8,232/year. If closed to motorized use, the cost of maintenance is $1,163/per year.

Zimovia Face Road (Segment 3)

If constructed, there are few benefits to keeping the Zimovia road open.

This segment crosses the Zimovia Face land unit. **Alternative 3** would only build the first 1/2 mile of this road, **Alternative 4** would build the first 3/4 of a mile. **Alternative 5** would construct the entire 1.85 miles of this road. These three alternatives would maintain the road for 5 years following harvest, then close it to all motorized traffic to reduce visual and wildlife habitat impacts. There are no major drainage structures within the first 3/4 miles. Periodic hand maintenance should be effective in reducing possible risk of drainage structure failure. **Alternatives 1, 2 & 6** would not construct this segment.

Table 3-12: Effects of Road Development and Maintenance, Segment 3

Issue	Effects of Road Segment 3
Scenic and Recreation	Parts of the road, particularly the last 1 mile and segments that pass through harvest units are visible from Wrangell Island and Zimovia Strait. The road may provide some access for hiking, biking, or motorized use but there is little recreation attraction other than dispersed hunting.
Economics	Access roads across Zimovia face would be needed in order to use conventional cable systems to more economically harvest all manageable timber. There are also areas that can only or best be harvested with a helicopter. Construction of the first 3/4 mile could provide a landing area that could benefit helicopter harvest. Keeping the road open would provide minimal benefits to future management activities over closure.
Freshwater System	Roads cross a few Class III streams with some potential to risk debris blockage in culverts. Oversize culverts and periodic hand maintenance will reduce this risk

Habitat Conservation	Improved access may increase harvest of some game species and furbearers in this fairly high to medium value ungulate winter range. Restricting access to walk-in travel would benefit habitat values.
Cost of Maintenance	Once closed, road maintenance would cost $700/year for the entire road under Alternative 5 (if kept open it would cost $4,872/year) . Under Alternatives 3 & 4 maintenance of 1/2-3/4 miles of this road would cost $150/year (compared to $2000/year to keep it open).

Honeymoon Pass to King George Creek (Segment 4)

Benefits to keeping this segment of road open include providing access to maintain stream crossings. Restricting access would benefit wildlife near King George Creek.

This road segment extends from the pass dividing Honeymoon and King George Creeks across upper King George Creek. It crosses two v-notches that flow into King George Creek. **Alternatives 2, 3 & 5** would build the entire 1.3 miles of this road. **Alternative 2** would keep the road open to King George Creek in order to maintain the v-notches structures but limit access into King George drainage in response to wildlife habitat and conservation issues. **Alternative 3** would keep the entire segment open, while **Alternative 5** would close the road 5 years after logging because future management would not be anticipated for a while. **Alternatives 1, 4 & 6** would not build this segment.

Table 3-13: Effects of Road Development and Maintenance, Segment 4

Issue	Effects of Road Segment 4
Scenic and Recreation	Portions of this road that cross unit 17 would be seen in the background from Stikine Strait. The road would provide access to hikers, bikers and motorized use across King George Creek and into the upper basin. If closed to motorized use at the creek, the road would provide access for fishing.
Economics	Keeping the road open would provide access for future management and possible small sales. If closed, at the crossing, bridge or culvert removal would ensure closure but be expensive to remove and re-establish for future management (particularly a bridge). If future management is not anticipated, removal might reduce maintenance costs over time.
Freshwater System	Segment 4 crosses King George Creek with a bridge. This segment also crosses two deeply notched Class III streams that have the potential to produce enough debris to block culverts and lead to road erosion. The risk and potential consequences (on down stream fish habitat) are high enough that oversize structures and periodic maintenance are needed to reduce the risk. Keeping the road open to these structures may benefit access for maintenance.
Habitat Conservation	This road segment crosses into the King George watershed which contains most of the retained old growth designated under this project. Wildlife values are higher in this watershed than the Honeymoon watershed. The pass that this road goes through was identified in Issue 4 as a 'pinch point' in an important travel corridor. Thus, restricting access to walk-in use would benefit wildlife conservation values.

Cost of Maintenance	The cost of keeping the road open to motorized travel is $3,872/year compared to a cost of $494/year to close the road to motorized traffic.

Access to Unit 18 (Segment 5)

If constructed, there are few benefits to keeping segment 5 open.

This segment of road is 1/2 mile long and accesses Unit 18 under **Alternatives 2 & 5.** Under both alternatives the road would be maintained for 5 years after harvest and then closed to all motorized traffic to reduce access to the south facing slope in King George watershed and reduce risks to the freshwater system by removing culverts from the stream on the east end of Unit 18. **Alternatives 1, 3, 4, and 6** would not construct this segment.

Table 3-14: Effects of Road Development and Maintenance, Segment 5

Issue	Effects of Road Segment 5
Scenic and Recreation	This road would provide limited additional access for hiking, biking or motorized use except for general hunting.
Economics	This road provides access to cable log the east side of Unit 18 and provides a landing to helicopter the west side of the unit. Keeping the road open would have minor benefits to future planting and thinning activities (walk-in access would still be relatively easy). Closing the road after 5 years may provide the opportunity to salvage any blowdown that might occur.
Freshwater System	This segment crosses one shallowly notched Class III stream on the east side of the unit. The size of alder trees present within the stream zone indicates mass movement within the past 80 years. Oversize culverts and periodic maintenance may reduce the risk of road washout. Since further road extension is not anticipated, removal of the culvert is recommended.
Habitat Conservation	Improved access to the south-facing slope of the King George watershed may increase hunting pressure and reduce the effectiveness of designated old growth habitat areas further west. This road crosses an important travel corridor. Restricting access to walk-in use would benefit wildlife conservation values.
Cost of maintenance	Cost of maintenance of this road after closure is $190/year (compared to $1,345/year to keep it open).

Upper King George Road (Segments 6 and 7)

Major drainage structures would be removed if these segments are constructed.

These segments access units 19-22 in upper King George Creek under **Alternatives 2, 3 and 5.** Alternative 3 would keep the first 1 mile of road open while Alternatives 2 and 5 would close both segments 5 years after harvest. All three alternatives would remove the two major drainage structures in the last .3 miles of road in order to respond to concerns for erosion and potential road washouts. **Alternatives 1,4, and 6** would not construct these segments.

Table 3-15: Effects of Road Development and Maintenance, Segments 6 and 7

Issue	Effects of Road Segments 6 & 7
Scenic and Recreation	Portions of this road would be seen by hikers at Bessie Peak. The road would provide limited additional access for hiking biking or motorized travel.
Economics	By closing the road at the south end of segment 6 and removing the two drainage structures, access could still be provided for outyear planting and thinning needs while substantially reducing the risks of road washout. Harvest of the units on segment 7 would remove the majority of manageable timber that could be accessed so there is no reason to keep it open.
Freshwater System	This segment crosses one stream in two separate locations, once at the end of a Class II and again where the stream is a deep v-notch Class III. There are several smaller streams that also have the potential to produce enough debris to block culverts. Oversizing the structures and periodic maintenance with eventual removal will reduce the risk of washout.
Habitat Conservation	Improved access may increase harvest of some large game animals. Restricting access to walk-in would benefit wildlife using the travel corridor between Kunk Lake and the King George drainage.
Cost of Maintenance	Once structures are removed, the cost of maintenance under Alternative 3 is $2,690/year to keep the first mile of road open to motorized use compared to $250/year under other alternatives.

Lower King George Road (Segment 8)

If constructed, restricting motorized access would retain the high habitat values in the lower King George area.

This segment accesses the lower King George land unit. **Alternatives 2 and 5** would build the entire 2.4 miles of this road. Five years after harvest, the road would be closed to motorized travel to reduce impacts on the wildlife habitat corridor and the designated old growth area. Some drainage structures near the end of the road would be removed since further road extension is not anticipated at this time. **Alternatives 1, 3, 4 and 6** would not build this segment.

Table 3-16: Effects of Road Development and Maintenance, Segment 8

Issue	Effects of Road Segment 8
Scenic and Recreation	This road is not visible from Stikine Strait. The road would provide improved access for hikers, bikers and motorized use in the King George valley. The road ends about 1/3 mile from the King George estuary but does not cross the ridge used by hikers accessing Bessie Peak.
Economics	Keeping this road open for a period of time after harvest would help reduce the cost of any anticipated planting activity as well as provide access to potential small sales.

Freshwater System	This segment crosses several Class III streams that have the potential to produce enough debris to block culverts and lead to possible erosion and road washouts. One large stream crossing is particularly high risk. Oversize structures, periodic maintenance and structure design may reduce the risk of washout. Structure removal at the end of the road would also help reduce risks.
Habitat Conservation	Improved access to the lower King George valley and stream system will reduce the effectiveness of the designated old growth in this area and may lead to increased hunting and trapping of furbearers.
Cost of Maintenance	After closure to motorized use and removal of some structures, the cost of maintenance would be $900/year (compared to $6,456/year if it were maintained for motorized traffic).

Honeymoon South Road (Segments 1 and 9, Alternative 2 only)

Alternative 2 proposes constructing the road on the south side of Honeymoon Creek.

Alternative 2 investigates the possibility of road development on the south side of Honeymoon Creek. This road crosses Honeymoon Creek twice, once about 1 mile upstream, and again near the pass. Under Alternative 2, the road would remain open to motorized use and possible future extension.

Table 3-17: Effects of Road Development and Maintenance, Segments 1 and 9

Issue	Effects of Road Segments 1 & 9
Scenic and Recreation	Parts of this road would be visible from Zimovia Strait as it crosses the larger muskegs. The road would provide improved access and an attraction for hikers, bikers and motorized use in the interior of the study area.
Economics	This road is located away from the bulk of the commercial forest in the Honeymoon watershed. Helicopter yarding or the development of temporary roads on the north side would be needed to access this forest land in the future. This would increase logging costs substantially over development of the road and harvest on the north side. Building this road on predominantly muskegs will also increase construction costs due to the increased rock base needed.
Freshwater System	This segment crosses Honeymoon Creek in two locations and also crosses several Class II and Class III streams that feed into Honeymoon Creek. Grades in and out of major crossings (especially approaches to bridge crossings) often create potential for direct deposit of surface erosion into streams. The risk of road or structure failure is substantially reduced compared to the north side road (segment 2) because most crossings are at low gradients with few sideslopes. Risk of washouts is low. Oversize culverts and periodic maintenance will reduce washout risk even further.

Habitat Conservation	Location of this road away from major old growth blocks on the north side of Honeymoon Creek will reduce the potential for increased harvest and maintain the effectiveness of old growth blocks. The road also crosses the pass at the head of Honeymoon Creek which is a travel corridor for big game in the study area. Keeping this road open will limit the effectiveness of the corridor for wildlife and would enhance hunting opportunities for people with means to transport motorized vehicles. Restricting access to walk-in travel would benefit habitat conservation values.
Cost of maintenance	The cost of maintaining this road for motorized access is $5,800 per year (compared to $550/year if it were closed).

Temporary Roads (Segments 13, 14, 17, 22 and 50)

Temporary roads, by definition, are closed after harvest.

Units 13, 14, 15, 22 and 5 have temporary roads within the units which will be closed after harvest. The standard closure technique is to remove any drainage structures and install waterbars for drainage. The total miles of temporary road included in these units is 1.3 miles.

Summary of Road Maintenance Costs by Alternative

Alternative 1= No road
Alternative 2= $11,500/year
Alternative 3= $15,000/year
Alternative 4= $8,500/year
Alternative 5= $5,000/year
Alternative 6= No road or harvest

Issue Three - Freshwater Systems and Estuaries

"Any decline in natural stocks impacted by roads, logging, public access, etc. will be off set by the 'fish farmers' [hatcheries]."

"The analysis should discuss whether projects could cause reductions in habitat capability or impair designated uses."

"The material along Honeymoon Creek should be left for at least 200 feet as salmon and trout are in this stream, even though I have heard officials say there are none in Honeymoon Creek so I guess I must not have eaten them..."

"Maintain a 300 foot buffer on all Class I streams in King George drainage. This will compensate for marginal soils to support roads and the fact that some Class I streams were probably not identified."

"I suggest staying at least 500 feet from any stream feeding King George or Honeymoon When developing the LTF do not create a large rock pit on the water. Move the sort yard up from the beach to minimize the conflict between logs and fishermen."

"If you do harvest in King George, keep roads and clearcuts away from all streams. Narrow buffers on side channels will most likely blow down due to high winds that blow down the valley, perpendicular to the side channels."

"Do not place an LTF on the King George side."

"Dungeness crab are abundant year round at the mouths of King George and Honeymoon Creeks. The crab population at Pats Creek was very good until log waste was introduced to the water, then the population dropped off. Crab gear has been hung up in cables and straps with bark in the pots."

"Nonpoint source water quality impacts should be minimized through project design and mitigation measures consistent with the state's nonpoint source program. The NEPA document should discuss the effectiveness of current BMPs based on what has been implemented at the project site and/or monitoring results."

"The soils in the project area should be described and related to landform stability and watershed sensitivity."

"Discuss the cumulative effects of any proposed future entries with respect to water quality and quantity and fish habitat."

Introduction

This issue reflects concern for the effects of timber harvest and road construction on the fish habitat of north Etolin Island. The state has designated the beneficial use of waters in the King George study area for the growth and propagation of fish, shellfish, other aquatic life, and wildlife (18 AAC 70). By law, we must maintain that use, protect riparian habitat, and prevent detrimental changes in water temperature, water chemistry, streamcourse blockages, and sediment deposits that adversely affect water conditions or fish habitat.

The freshwater system includes streams, wetlands, and sediment sources with potential influence on fish habitat.

The freshwater system includes fish streams and their tributaries, floodplains and riparian areas, wetlands (including estuaries) and sediment sources with potential influence on fish habitat. This issue also addresses wildlife habitat associated with the freshwater system.

Most of the freshwater system is within the King George and Honeymoon land units. Most of Zimovia, Red Mountain, and Porcupine land units and none of Chichagof Face land unit drain to fish streams. The unit and road cards (Appendix B) address slope stability and water quality concerns throughout the study area. This section will present the freshwater system components, describe their distribution, and compare alternatives by measuring potential impacts on aquatic habitat.

Freshwater System Components

Fish Habitat, Floodplains, and Riparian Areas

Most of the freshwater system lies within the King George and Honeymoon land units.

Fish Habitat: Streams containing fish populations comprise the core of the freshwater system. ADFG inventoried most of the study area streams in 1980. Except for streams located in the Chichagof Face land unit, we sampled all study area streams by electrofishing in 1993-94 using coho salmon fry or juveniles as the indicator for anadromous fish presence. Electrofishing also determined the extent of resident fish populations in streams inaccessible to anadromous fish. We did not sample the steep bedrock streams flowing directly into salt water from the Chichagof Face land unit.

Table 3-18 displays the distribution of anadromous (Class I) and resident (Class II) stream length among land units. King George Creek and Honeymoon Creek are the most productive fish streams in the study area. We did not find Class I streams in the Red Mountain, Chichagof Face, or Porcupine land units. The FEIS may include additional stream information as we continue to update our computer (GIS) database. The DEIS unit and road cards display all field-verified streams.

Table 3-18: Stream Length by Class (feet)

Land Unit	Class I	Class II
Chichagof	0	0
Zimovia	<100	<300
Red Mountain	0	300
Porcupine	0	<300
Honeymoon	1,100	8,710
King George	47,800	12,110
Total	**48,900**	**21,500**

Floodplains and Riparian Areas: Floodplains moderate floodflow, recharge low flows, and provide deposition areas for sediment. The decay of salmon carcasses deposited on floodplains during fall peak flows is an important part of the nutrient cycling process. Riparian areas, including floodplains, contain vegetation that provides temperature-moderating shade, large wood for fish habitat and channel stability, and litter fall as a nutrient and food source for fish. Intact riparian areas also intercept sediment and provide critical habitat for wildlife species dependent on aquatic organisms. The lower King George land unit contains about 80 acres of floodplain soils; we did not map narrower floodplains separately but included them in the riparian model (below).

We used a riparian model to display streamside forest processes important to fish and wildlife habitat for all streams currently included in the GIS database (Figure 3-14). Tongass National Forest stream classification by channel types reflects physical differences in stream channels and stream processes (USDA Forest service, 1992). The model assigns a consistent streamside width to each stream segment according to channel type characteristics. The width is based on streamside vegetation data for streams dependent on large woody debris for stability or habitat quality. Total riparian widths (channel plus two sides) vary from 140 feet to 400 feet. The smaller widths reflect well-contained bedrock channels where riparian influences are most critical immediately adjacent to the stream. The larger widths characterize alluvial stream channels dependent on large wood for stability and habitat quality. These larger widths encompass floodplains and some important wildlife habitat. The study area contains about 480 acres of riparian area represented by this model. This number will increase in the FEIS as we update the GIS streams inventory with field survey information.

Class III Tributaries

The freshwater system includes over 40 miles of streams that do not contain fish but have potential influence on downstream fish habitat (Class III streams). Although some of these streams do not flow year-round, when they do flow, they transfer water, sediment, nutrients, and coarse wood to fish streams. Class III streams also provide habitat for micro-organisms, aquatic invertebrates, and amphibians that may be important food sources for fish and some wildlife species. Class III stream riparian areas are often very narrow or indiscernible.

An additional 20 miles of streams flow directly to saltwater with no influence on the fish habitat in the freshwater system. These streams are also Class III streams.

Wetlands (Including Estuaries)

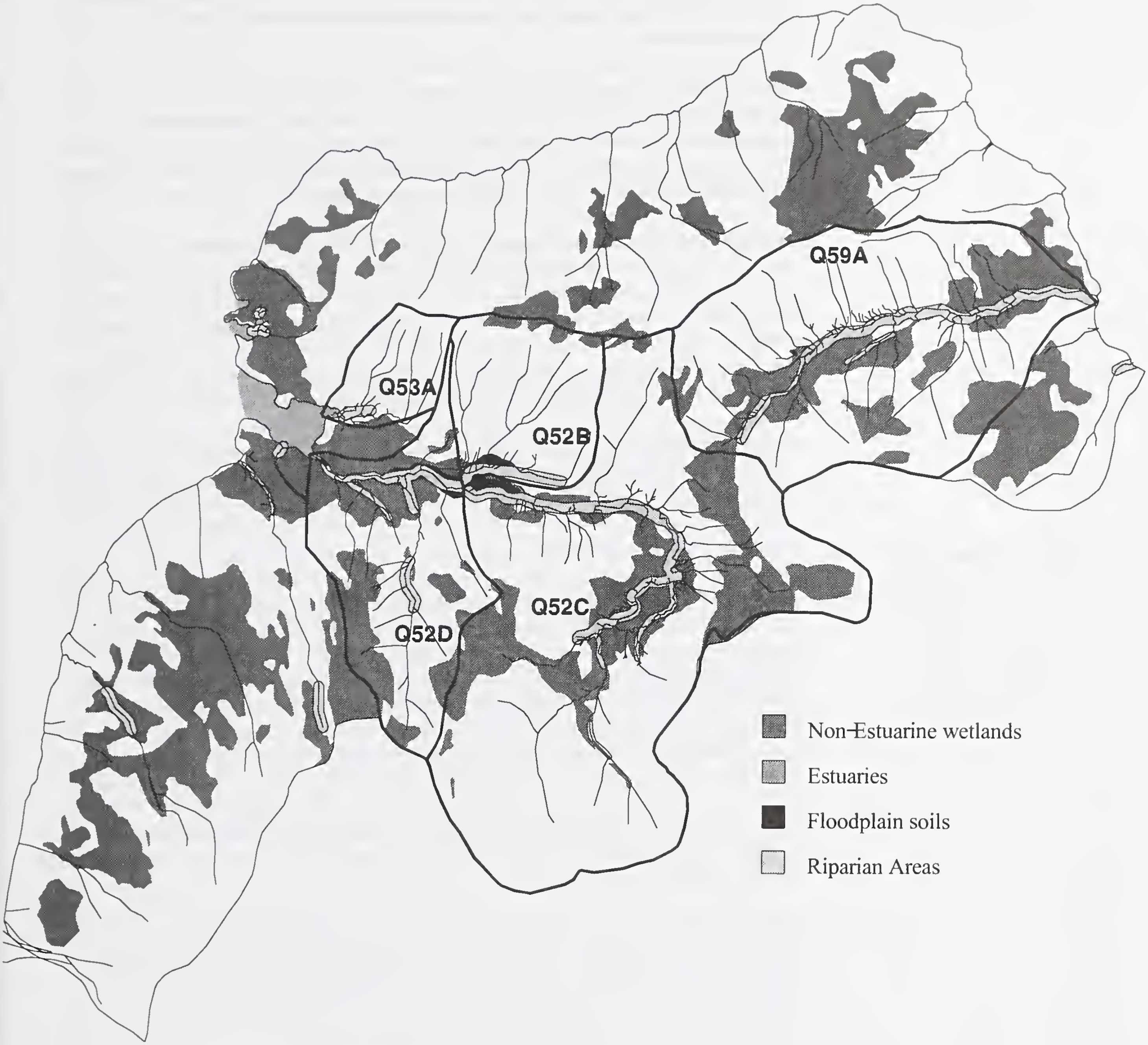
Wetlands make up about 20% of the project area and include lakes, estuaries, floodplains, muskegs, and forested wetlands.

We used The National Wetlands Inventory (Cowardin et al., 1992) and Stikine Area soil inventory to map and classify wetlands. A total of 4,700 acres of wetlands were mapped, including high mountain lake and estuarine areas. Wetlands make up about 20 percent of the King George project area. Wetlands are displayed in Figure 3-14, and include lakes, estuaries, floodplains, and non-estuarine wetlands.

Wetlands are valued for physical functions such as flood conveyance, surface and groundwater regulation, sediment collection and temperature moderation; chemical functions such as nutrient storage, pH moderation, carbon storage; and biological functions such as habitat for terrestrial, aquatic and marine plants and animals, and wood fiber production.

Numerous wetland types make up the non-estuarine wetlands. The colloquial term "muskeg" is used to refer to the mosaic of fens, bogs and scrubby forests. High precipitation and low evaporation rates contribute to the high amount of ground water resulting in the formation of wetlands. The type of vegetation growing on the wetland is primarily controlled by ground water chemistry, the amount of water and to an extent elevation. The wetlands present in the study area are described as follows.

Figure 3-14, Freshwater System Maps


Q59A
Q53A
Q52B
Q52C
Q52D
Non-Estuarine wetlands
Estuaries
Floodplain soils
Riparian Areas

Wetland types include...

Alpine Shrubland/ Muskeg (220 acres): Vegetation is a combination of sedge meadows on deep peat deposits in depressions, with low growing blueberry and heath on higher rises. Stunted lodgepole pine and mountain hemlock are common. These wetlands function mainly as areas of snow storage and meltwater discharge and summer habitat for terrestrial wildlife species. These wetlands are located at an elevation of 1500-2,500 feet in the project area.

Short Sedge Muskeg. (220 acres): These wetlands function as areas for recharge of groundwater and streams; deposition and storage of sediment, nutrients and other chemicals; waterfowl habitat, particularly Vancouver Canada geese and sandhill cranes; terrestrial wildlife habitat, including black bear, mink, river otter, and beaver foraging. They support fen communities dominated by short sedges.

Forested Wetland/Sedge Complex. (1,700 acres): This is the most extensive wetland type in the study area. Vegetation is a mosaic of forested community types and sedge meadow fens on poorly drained peat soils. The forested areas are often linear features along streams dissecting a muskeg; and are generally productive forest sites. The mosaic pattern increases the diversity of this wetland type. Waterfowl habitat, particularly Vancouver Canada geese and sandhill cranes; terrestrial wildlife habitat, including black bear, river otter, mink, marten, and beaver foraging are provided by this wetland type.

Scrub-Shrub/Muskeg (610 acres): This wetland supports a mosaic of forested and bog vegetation. When conifers are present they are less than 25 feet high. Forested areas are found on gently sloping hills; marginally productive sites. These wetlands function as areas for recharge of groundwater and streams; deposition and storage of sediment, nutrients and other chemicals.

Forested Wetland (1240 acres): Forested wetland plant associations, including those with skunk cabbage and deer cabbage as a major ground cover component. These wetlands function as areas for recharge of groundwater and streams; deposition and storage of sediment, nutrients and other chemicals. This includes areas which support a mixture of wetlands and non-wetlands in a complex mosaic of microtopography that controls drainage and water regimes. The lower King George floodplain supports Sitka spruce plant community types, including Sitka spruce/devil's club and Sitka spruce/blueberry/skunk cabbage plant associations. The soils are mainly the Tonowek soil series, with lesser amounts of the Tuxekan series. Within the floodplain, there are significant areas of gravely alluvium overflow channels and non-wetland soil types. Forested wetlands also occur on upland sites not associated with riverine habitat; soils are mainly the Maybeso soil series.

Sphagnum Peat Muskeg (830 acres): Bogs characterized by deep, very-poorly drained accumulation of sphagnum moss; the soil series is Kogish. These wetlands function as areas for recharge of groundwater and streams; deposition and storage of sediment, nutrients and other chemicals. They are a valuable source of biological diversity, supporting a number of unique and some locally rare plant species. It is found in the King George and Honeymoon valley bottoms.

Riverine: Aquatic habitats within the wetted perimeter of a stream are termed "Riverine" wetlands in the National Wetland Classification System. These wetlands are not included as mapped acres in the wetland analysis because we decided they were more accurately portrayed by our riparian model.

Lakes and Ponds: There is a 21 acre lake and numerous small muskeg and beaver ponds within the study area. Although many do not contain fish habitat, as part of the freshwater

system they play an important role in sediment deposition, nutrient cycling, and amphibian habitat.

Estuarine (160 acres): Estuaries are areas where fresh water mixes with salt water; unique brackish environments supporting complex and productive ecosystems. They are the most valuable wetlands in the project area, in terms of providing fish and wildlife habitat. Although salt water heavily influences estuaries, we included them in the freshwater system because streams provide the major link between forest management and estuarine ecosystems. Any analysis of fish habitat productivity would be incomplete without addressing estuarine use at various life stages. Estuaries are found in or adjacent to the King George, Honeymoon, and Zimovia Face land units. Grasses and sedge, especially tufted hairgrass, Lyngby's sedge and dune wildrye are the dominant species in the upper-intertidal zone. Common plants on upper beaches include beach-carrot, beach pea, large headed sedge, paintbrushes, and lupine. Shingle beaches, composed of large gravels or cobbles are located north of Honeymoon creek.

Estuaries are the most valuable wetlands for fish and wildlife habitat.

Upland Sediment Sources

There are two main kinds of soil erosion that take place in Southeast Alaska: surface erosion and mass wasting. Surface erosion is caused by wind or water. This type of erosion takes place over a long period of time and produces a relatively small amount of sediment at a constant rate. Surface erosion is practically nonexistent under the forest canopy except in areas of mass wasting, because the mineral soil is covered with a thick organic surface layer. Mass wasting occurs in major pulsating events, such as landslides.

Mass movement index (MMI) classes are used to group soil/landtype units that have similar properties relative to the stability of natural slopes. Four classes, very high, high, moderate, and low, (MMI 4, 3, 2, and 1) are used to rank soil/landtype units according to their relative potential for mass wasting, i.e. debris avalanches. While slope gradient is the primary site factor determining the stability of natural slopes, other soil and geologic properties, such as cohesion, moisture regime and the presence of a prominent slip plane are also used to determine relative stability of soil/landtype units. Mass-wasting classes as used here are restricted to relatively shallow transitional failure off the soil mass, and specifically excludes deep rotational failures and debris failures within stream channels. The classes are as follows.

Four classes are used to rank areas for landslide potential:

- ***MMI4 - Very High***
- ***MMI3 - High***
- ***MMI2 - Moderate***
- ***MMI1 - Low***

Soil map units with **MMI 4** are the least stable and have the greatest probability of slope failure. Slope gradients exceed the natural angle of stability. Included are well-drained soils on slopes greater than 75 percent and soils with restricted drainage (somewhat poorly and poorly drained soils) on slopes greater than 60 percent. Nearly all natural occurring landslides initiate in units of this class. These areas, often, but not always, have visible indications of instability or past failures, such as slide scarps, tension cracks, jack-strawed trees, and/or mixed pedogenic horizons. The risk of management induced slope failure is so high on these areas that they are generally precluded from normal forest harvest and roading activities and are removed from the commercial forest land base.

Soil map units in the **MMI 3** class include the somewhat poorly and poorly drained soils on slopes ranging from 35 to 60 percent. Soils are generally stable in an undisturbed condition, however, any natural disturbance or management practice that adversely changes the complex soil shear strength-shear stress relationship can result in slope failures. Management practices should avoid interrupting the natural surface and subsurface drainage patterns and minimize disturbance to the soil surface. Excessive slope loading by sidecasting spoil material should also be avoided.

Soils in the **MMI 2** class include the well drained soils on slopes ranging from 35 to 75 percent. Soil/landtypes in this class can be managed without a high risk of landslides if management practices are designed to maintain the soil shear strength, rooting strength, and by avoiding increasing the effective weight of the soil mass.

Soil map units with a **MMI 1** mass movement index have a low risk of slope failure. These areas are normally not subject to debris avalanching, however management practices designed to protect streambanks and v-notches, and prevent surface erosion may be applicable.

In addition to the MMI 4 areas, **v-notches and landslide tracts** have a very high risk of slope failure. V-notches serve as direct sediment routing sources delivering sediment to steams. Landslides generally have a deposition zone above the stream. However, small streams usually drain the slide tracts, increasing the sediment delivery to streams.

Rooting strength is a major factor contributing to soil stability.

Rooting strength is a major factor contributing to soil stability on oversteepened slopes. With the harvest of timber, roots deteriorate and are no longer effective at providing stability.

The Freshwater System in King George Land Unit

Fish Habitat, Floodplains, and Riparian Areas

King George Creek is the most productive stream in the area.

Fish Habitat: Relative to other study area streams, King George Creek is by far the largest (in terms of stream length and drainage area) and most productive (in terms of species richness and escapements) fish stream. Pink, chum, coho, and sockeye salmon, cutthroat trout, and Dolly Varden char inhabit King George Creek and its tributaries. A small steelhead population is likely, but has not been verified. Because of its existing "undisturbed" condition, relative productivity, floodplains, and enhancement opportunity we performed a detailed fish habitat survey of Class I and II tributaries of King George Creek in 1993-94.

Survey results indicate that large woody debris, stream channel morphology (pools) and substrate (stream sediment) size provide excellent fish habitat conditions in much of the mainstem of King George Creek as well the lower reaches of many of its tributaries. Bears, eagles, wolves, beaver, land otters, mink, weasel, and marten use these streams and riparian areas for food and habitat.

Table 3-19 compares surveyed habitat parameters from King George Creek with the regional Riparian Habitat Management Objectives (RHMOs) obtained from the Anadromous Fish Habitat Assessment (AFHA) Report to Congress (USDA Forest Service 1995). The RHMOs are expressed as a range of values based on the 25th, 50th (median), and 75th percentiles stratified by channel types that have similar physical characteristics (USDA Forest Service 1992). The data was collected from pristine watersheds throughout the Tongass National Forest. The King George Creek data has not been adjusted for observer bias, but is still useful for comparison with other pristine watersheds.

Table 3-19, Comparison of King George Creek Habitat Data with RHMOs

RHMO Parameter	Channel Type or Process Group	Regional Percentile 25%	50%	75%	King George Values
Pieces LWD/1000 m2	FP4	8	24	34	57a
	LC & MC	6	15	22	25a
	MM1	27	45	82	99a
	MM2	33	35	44	40
Percent Pool Area	FP4	35	47	59	57
	LC	8	20	27	7b
	MC	11	22	39	9b
	MM1	28	40	52	40
	MM2	2	22	39	22
Bankfull width-to-depth	FP4	16	25	35	15b
	MM1	9	12	18	8b
	MM2	17	24	33	17

a - Above RHMO
b - Below RHMO

Large Woody Debris (LWD) is defined as wood material greater than 10 centimeters in diameter and 1 meter in length, protruding into the active stream channel area. Large wood is critical in many streams for maintaining habitat cover and complexity for fish and aquatic invertebrates that provide an important food source for fish. LWD structure, recruitment, and depletion can be greatly influenced by management activities. King George Creek exceeds the regional objectives for LWD in floodplain (FP), Large Contained (LC), Moderate Gradient Contained (MC), and Narrow Moderate Gradient Mixed Control (MM1) streams.

Pools are very important stream features that provide habitat for rearing juveniles, cover for adults, and optimal spawning sites at pool tail-outs. Changes in the amount of pool units can indicate shifts in the balance between sediment and streamflow regimes, and can therefore be good indicators of cumulative watershed effects. Survey data indicate that King George Creek has slightly less pool area than the regional ranges for Large Contained and Moderate Gradient Contained channel types. Otherwise, pool area provided by King George Creek is quite similar to other pristine systems.

Width-to-Depth ratio is a general index of channel stability in alluvial channels, predominantly Floodplain and Moderate Gradient Mixed Control streams. Channel segments with consistently high width-to-depth ratios indicate sediment storage and channel aggradation which can lead to reduced flow depth, loss of pool area and volume, de-watering of aquatic habitat, and adverse changes in stream temperature ranges. King George Creek falls into the lower range of width-to-depth objectives.

Upper and lower King George Creek are separated by a partial migration barrier located 2.5 miles from salt water. Only Dolly Varden char are known to gain passage through the 300-foot series of bedrock falls. Upper King George Creek has over two miles of very low gradient stream with suitable substrate for coho and steelhead spawning. Deep pools and beaver dams in both upper and lower King George Creek also provide good coho rearing habitat. Passage for coho and steelhead (if present) to upper King George Creek appears feasible with minimal investment and maintenance by blasting jump pools. The mainstem of upper King George Creek and its low gradient tributaries are considered Class I stream since the barrier may be enhanced.

King George Creek has the most valuable riparian habitats.

Floodplains and Riparian Areas: Soil, vegetation, and stream channel characteristics along two reaches of King George Creek indicate that these are the most important floodplains in the study area. Riparian areas along the alluvial channels in this watershed are the most well-developed in the study area, reflecting the influence of overbank streamflows on the adjacent landform and vegetation. The floodplain channel and its tributaries provide the most productive fish habitat along the lower two-thirds of King George Creek. Well-used game trails along the mainstem and tributaries of King George Creek indicate its importance as a wildlife travel corridor. This area is heavily shaded by topography and riparian canopy. Aquatic productivity through this reach may be light- or temperature-limited.

All harvest units are over 100 feet from the mainstem to protect several Class I and II tributaries.

All harvest units in the King George drainage are over 100 feet from the mainstem in order to protect this high value riparian area. The width of the buffer varies from unit to unit but in many cases is dictated by the presence of small Class I and II tributaries which were discovered during intensive field reconnaissance. The need to adequately buffer these streams in combination with the design of logical harvest settings resulted in buffers that exceed TTRA requirements.

Windthrow plays a natural role in supplying large wood to streams, and has been identified as a concern for long term buffer stability. When an opening is created by clear-cut harvesting, it often leaves an abrupt face of standing timber which is susceptible to windthrow (Harris, 1989). A study is underway to determine both the extent of buffer windthrow and its consequences on stream channels across the Tongass National Forest (USDA Forest Service, unpublished). In general, existing windthrow in the study area appears to be concentrated on the King George side of the pass between Upper King George and Honeymoon land units, in the vicinity of unit 17. Harvest prescriptions leaving some standing timber may reduce the potential for accelerated blowdown. Each unit card addresses windthrow risk.

Stand openings created by Units 23 and 24 along the south side of King George Creek may increase sunlight penetration to the riparian area and stream which could increase the primary productivity, but this is not expected to be a measurable impact.

The proposed road crossing King George Creek was located to account for floods, spawning habitat, fish passage, channel stability, and large wood transport.

The interdisciplinary team evaluated four possible King George Creek road crossing sites. The lower crossing was dropped from consideration. This site would have required a large and expensive bridge to adequately address channel stability and fish habitat concerns. We considered three crossing sites in Upper King George land unit, all of which cross a narrow floodplain. The road was carefully located and designed to account for flood processes. Stream crossing structure design considers spawning habitat, fish passage, flood design flows, channel stability, and transport of large debris. The road approach minimizes floodplain impacts such as constriction of overbank flows or multiple side channel and tributary crossings.

The specified road north of Unit 23 enters the modeled riparian area. Field verification indicates the road is more than one hundred feet from the creek here while also avoiding unstable soils.

Class III Tributaries

The King George land unit contains the greatest amount of Class III stream length in the study area. Steep, deeply-incised streams (V notches) located on the north side of King George Creek are especially efficient at rapidly transporting sediment from unstable sideslopes or during debris flows. One of these streams, located at the west boundary of

Unit 18, is too deep to economically or safely cross with a road. Some Class III stream crossings planned in this drainage required careful road alignment and design to maintain channel stability and withstand high bedload and debris transport. These structures will require routine inspection and periodic maintenance to minimize the potential for structure failure and downstream channel scour.

Some Class III streams and v-notches present a high risk for road crossings.

Wetlands (Including Estuaries)

Estuarine: Shelter provided by King George Bay combined with the relatively large drainage area of King George Creek provides the most well-developed and productive estuary in the study area. The substrate of the deeper (low tide) area provides good shellfish habitat and a moderate amount of intertidal salmon spawning habitat. The shallower intertidal area stores fine sediment supporting sedges and grasses which bears and ungulates feed on in the spring. This salt marsh also provides critical salmon rearing and smolt transition habitat, and shorebird and waterfowl habitat. Adult fish use this estuary as a staging area for migrating up King George Creek. Eagles, ospreys, bears, wolves, mink, land otters and other wildlife are drawn to these attractions.

Units 26, 27, and 28 and the road south of King George Creek are nearest to the King George estuary. The units range from 1600 to 1800 feet away and the road ends about 1800 feet away.

Units and roads in Alternatives 2 and 5 are 1600-1800 feet away from the King George estuary.

Two small coves north of King George Bay also support small estuaries. We propose a patch cut with ten percent retention (Unit 1) about 1100 feet from these small estuaries.

The interdisciplinary team evaluated several possible Log Transfer Facility (LTF) locations on the west side of the study area, some near the King George estuary. These sites were dropped from further consideration due to potential impacts on marine and estuarine resources. The site selection criteria and effects on estuarine and marine resources is further discussed in Appendix D.

Non-estuarine: The most important non-estuarine wetlands in King George land unit are associated with the stream system: floodplains and beaver complexes with tall sedge fens. Road location avoided these areas as much as possible. Extensive forested and forested/sedge complex wetlands are located in the King George valley. This land unit contains the most harvested wetland acreage, primarily in Unit 15 and 19. Special road construction measures such as installation of culverts to allow for water movement during low flows as well high flows will mitigate the affect of road construction on the sedge and sphagnum muskeg wetlands.

The most important non-estuarine wetlands are floodplains and beaver complexes with tall sedge fens.

Upland Sediment Sources

King George land unit contains the largest blocks of MMI-4 soils in the study area. We avoided locating roads or units on oversteepened slopes north of King George Creek and below Bessie Peak. The north side of King George Creek has steep, highly dissected mountain slopes with numerous old landslide scars. The largest landslide is visible from King George Bay. For the most part, the wide valley bottom provides an area for sediment deposition protecting the stream from massive sediment loading. The valley is relatively narrow between Unit 18 and Unit 23.

Road construction in the King George land unit will be a sediment source. Prompt stabilization of bared soil and cut and fill slopes along the road will minimize effects on the freshwater system.

The Freshwater System in Honeymoon Land Unit

Fish Habitat, Floodplains, and Riparian Areas

Honeymoon Creek has a total block to salmon 1,000 feet from saltwater.

Fish Habitat: The Class I reach of Honeymoon Creek was surveyed in 1994. Honeymoon Creek contains a total block to anadromous fish access about 1000 feet upstream from salt water. Coho salmon, cutthroat trout, and Dolly Varden char inhabit the floodplain stream below the barrier. Pink and chum salmon likely spawn in this lower reach, but the timing of the survey could not confirm their presence. The size of aboriginal fish traps found at the mouth of Honeymoon Creek would seem to indicate that the anadromous fish access might have been greater or the stream was somehow more productive in prehistoric times. Recent observations of the Harding River (Bradfield Canal) indicate that anadromous fish access can dramatically change as a result of a single flood.

The riparian area adjacent to Honeymoon Creek is narrow and wildlife don't use it as much as King George.

Floodplains and Riparian Areas: The riparian area adjacent to much of Honeymoon Creek is narrower than that found in the King George drainage because the stream is contained within a bedrock channel and floods infrequently. Terrestrial wildlife species do not seem to use this riparian corridor as heavily as the King George riparian areas. Downstream of the barrier, a portion of the Honeymoon Creek floodplain was harvested in 1965. An undisturbed buffer was maintained along most of the stream channel and it does not appear to have been directly affected.

Class III Tributaries

Honeymoon land unit contains the highest density of Class III streams in the study area. This is reflected in the large proportion of stream crossings proposed in this land unit. These stream crossings are less risky from a road maintenance and water quality perspective than some of those in the King George drainage. The road alignment on the north side of Honeymoon Creek minimizes fish stream crossings while avoiding over-steepened slopes.

Wetlands (Including Estuaries)

The proposed log transfer facility is 2,600 feet from the mouth of Honeymoon Creek.

Estuarine: The mouth of Honeymoon Creek is not sheltered and lacks the topography supportive of a well-developed estuary. Nevertheless, this area is known as productive shellfish habitat and provides limited intertidal salmon spawning habitat. Potential effects on this estuary and near-shore crab habitat was an important consideration in locating and designing the LTF, which will be about 2600 feet north of the creek mouth. Appendix D provides further detail about the LTF. Unit 8 and Road Segment 1 (including the sort yard) each lie about 2100 feet from this estuary and comprise the nearest proposed disturbance.

Non-estuarine: Forested wetlands, sedge and sphagnum muskegs dominate the Honeymoon valley bottom. The proposed road will pass through wetland habitat near the pass and near Unit 6. The alternate road located south of Honeymoon Creek (Alternative 2 only) would affect more wetland than any other proposed road segment while avoiding a unique, possibly rare, large diameter Sitka spruce/Alaska yellow-cedar stand. The proposed sort yard will be about five acres in size and is located in a scrub-shrub/muskeg wetland.

Upland Sediment Sources

Over-steepened slopes are located on both sides of Honeymoon Creek. Roads and units are not located on these slopes. The upper portion of Unit 13 has steep slopes with MMI-3 soils. Selective harvest, retaining a high number of residual trees and minimal ground disturbance with helicopter yarding is expected to minimize mass wasting risk.

The Freshwater System in Other Land Units

Fish Habitat, Floodplains, and Riparian Areas

Less than 400 feet of anadromous and resident fish habitat at the mouth of a small stream on Zimovia face and less than 300 feet of resident fish habitat on an alluvial fan at the mouth of Porcupine Gulch land unit were harvested in 1965. The habitat in these small streams may have been directly affected by the harvest practices employed at that time. Alder trees dominate the riparian vegetation along these streams and habitat currently does not appear to be degraded in these short reaches.

Class III Tributaries

Only a few Class III tributaries feed the freshwater system outside of King George and Honeymoon land units. Unit and road cards show Class III stream protection for all Class III streams in the study area.

Wetlands (Including Estuaries)

Estuarine: Fresh water/salt water mixing zones at the mouths of small creeks along the study area shoreline may provide limited intertidal spawning and nutrients supporting shellfish and other marine life.

We considered two locations for an LTF on the east side of the study area. The northernmost site would have directly affected a small Class III stream. A final site about 2600 feet north of Honeymoon creek was chosen. The site overlaps with a thin estuarine area mapped along the shore. However, this site is a steep rock face with no estuary features such as intertidal flats or marshes. The transition from land to saltwater is abrupt, with no mappable streams in the vicinity.

The interdisciplinary team modified the LTF and sort yard design to reduce scenic impacts and minimize the amount of bared ground in close proximity to marine waters. The sort yard will be located 800 feet away (inland) from the LTF. The LTF card and sort yard maps (Appendix D) describe site specific design and erosion control measures intended to minimize impacts to estuarine and marine resources. Appendix D contains the LTF site selection criteria and discusses potential affects on marine resources.

A sort yard will be located 800 feet inland from the log transfer facility.

Non-estuarine: There is a 21 acre lake in the Red Mountain land unit at 1,600 ft elevation. Sampling of the outlet stream upstream from salt water revealed no anadromous or resident fish species. Since no harvest units or roads are proposed nearby, the lake itself was not sampled. Scattered muskegs and forested wetlands are in all land units.

Upland Sediment Sources

The oversteepened hillslopes draining to aquatic habitat outside of King George and Honeymoon land units are found in Porcupine Gulch land unit. Timber quality is poor in this area so timber harvest is not proposed.

Alternative Comparison

Timber harvest, road construction and road use have the potential to impact fish habitat by changing streamflow regimes, large wood supply and distribution, and sediment supply. Maintaining intact floodplains and riparian areas, limiting erosion risk by minimizing exposed soil and avoiding unstable soils, minimizing stream channel disturbance at road crossings, and limiting cumulative road length and harvested area in each watershed are all primary components of the fish habitat protection strategy in the King George study area. Most of these measures also protect fish species depending on the habitat, wildlife species depending on fish as food, and wildlife species depending on riparian areas for habitat and travel corridors.

The Report to Congress, Anadromous Fish Habitat Assessment (USDA Forest Service 1995), commonly referred to as the AFHA Report, was completed during the planning effort on King George. Some of the improvements in aquatic habitat protection recommended in the report have been incorporated into this project. Appendix E contains a comparison of this DEIS with the recommendations in the AFHA Report.

A table at the end of Appendix B summarizes water quality and fish habitat concerns for units and roads.

We evaluated each proposed unit and road segment with respect to its likely influence on the freshwater system. For example, a unit with MMI-3 soils (high sediment source risk) far away from streams (low sediment transport risk) does not pose as great a risk to fish habitat as a similar unit containing streams. A table at the end of Appendix B summarizes water quality and fish habitat concerns for all units and assigns a risk rating to units with moderate and high risk of sediment transport to fish habitat. Units 9, 10, 11, 12, 13, 14, 17, 18, 22, and 26 are most likely to affect fish habitat. A table at the end of Appendix B summarizes freshwater system concerns for each road segment. Road segments 2, 4, 7, 8, 9, and 13 are most likely to affect fish habitat. Site selection for monitoring BMP implementation will emphasize these units and roads.

Table 3-20 displays the affects of harvest and road construction by comparing freshwater system acres of harvest and miles of road construction across alternatives.

Table 3-20, Harvest Acres and Road Miles Within the Freshwater System by Alternative

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
Harvest Acres	260	560	480	350	790	0
Road Miles	0	9.8	6.7	3.3	9.7	0

Alternatives 2 and 5 pose the highest risk to freshwater systems. Alternatives 1 and 6 pose the least.

Alternative 5 proposes the highest risk in this comparison, followed by Alternative 2. Alternative 4 poses the least risk of the roaded alternatives since it does not harvest units tributary to King George Creek. Alternative 1 poses the least risk of any action alternative since it disturbs the least acreage directly tributary to aquatic habitat. Alternative 6 does not pose increased risk of water quality or fish habitat degradation.

Road miles are one of the best all-round indicators of freshwater system impacts. Alternatives 2 and 5 propose the greatest amount of road throughout the freshwater system. Alternative 3 proposes a road through Honeymoon but less road miles in King George. Alternative 4 does not propose any road in the King George drainage and Alternative 1 proposes no roads at all. Road segments 4, 7, and 8 received the highest risk ratings for potentially affecting fish habitat. These roads contain critical stream crossings and slope stability concerns as described in Appendix B. Critical stream crossings include all streams with fish habitat as well as Class III streams with evidence of high debris and bedloads. Table 3-21 compares critical stream crossings across alternatives.

Road segments 4, 7, and 8 have the greatest potential to affect fish habitat.

Table 3-21, Critical Stream Crossings by Alternative

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
Critical Stream Crossings	0	14	9	3	11	0

Effects on Fish Habitat, Floodplains, and Riparian Areas

The King George Creek crossing site proposed in Alternatives 2, 3, and 5 minimizes concerns for channel stability while maintaining an approach that minimizes other stream crossings. Alternatives 1 and 4 have the least impact on floodplains since they do not propose any floodplain crossings. Bridges and culverts do present a risk of blockage and potential failure at high stream flows which can result in downstream scouring.

By law, all Class 1 stream and Class II streams tributary to Class I streams receive a minimum 100-foot no-harvest buffer. The objective of this buffer is to maintain an intact streamside area providing shade, large wood, and minimal stream or riparian area disturbance. The benefits of buffers in contrast to streamside harvest of alluvial stream channels are fairly intuitive and well documented (Murphy et al, 1986; Murphy and Koski, 1989; FEMAT, 1993; Ralph et al, 1994). The electrofishing survey resulted in modification of many of the units to account for buffers along previously unmapped streams.

No alternative directly impacts on riparian areas by harvest.

The mandatory 100-foot no harvest buffer excludes harvest from most riparian areas. Minor overlaps between unit boundaries and modeled riparian areas occur in all action alternatives. Alternative 5 has the greatest overlap, followed by Alternatives 3, 4, 2 and 1, in that order. These overlaps have been field reviewed and, except for some buffer windthrow risk, no direct impacts to riparian areas or stream channels are expected.

No floodplain harvest is proposed under any alternative. Alternatives 2 and 5 propose units approaching the King George floodplain, but buffered sidechannels and fish stream tributaries in this area resulted in unit modification away from the mapped floodplain.

No floodplain harvest is proposed.

Effects on Class III Tributaries

Roads and harvest units involving Class III streams sometimes present greater risk to downstream fisheries than direct impacts to fish streams because of their efficient sediment transport regimes. Alternatives 5 and 2 present the highest risk for Class III stream crossings followed by Alternatives 3 and 4. Alternative I does not propose stream crossings.

Alternatives 2 and 5 have the highest risk Class III stream crossings.

Class III stream protection (Appendix B) and helicopter yarding minimizes disturbance.

Most of the proposed harvest units contain Class III streams which are typically protected through a combination of unit boundary design, partial harvest buffers, or yarding operations designed to minimize sideslope and channel disturbance by felling trees away from stream channels, providing log suspension during yarding, and removing debris inadvertently entering the streams during harvest. Appendix B describes and displays Class III stream protection in units.

Observation of timber harvest by helicopter, such as the recent Campbell Timber Sale in the Bradfield Canal, indicates that helicopter yarding minimizes Class III stream disturbance.

Effects on Wetlands (Including Estuaries)

All alternatives avoid impacts to the King George estuary.

Estuarine: All alternatives avoid impacts to the King George estuary. Alternative 5 proposes the greatest amount of disturbance near the estuary (four units, two road segments, and the LTF). None of the alternatives propose any disturbance within 1100 feet of estuaries. The nearest road is 2100 feet away. Although Alternative 1 proposes no LTF, it proposes three units within 2000 feet of the King George estuary.

Construction of the LTF will impact the estuarine shingle beach north of Honeymoon Creek. A shot-rock ramp and turn around pad will occupy 0.2 acres of intertidal and subtidal area.

Non-estuarine: The acres of wetlands affected by the proposed timber harvest and road construction varies with alternative. Road construction across wetlands is expected to be the primary factor affecting the wetlands, resulting in permanent reduction in wetland acreage. Roads will be constructed using overlay construction methods in accordance with best management practices described in FSH 2509.22, the Soil and Water Conservation Handbook to protect water quality and associated wetland functions.

Roads and units were located to avoid the highest value wetlands.

The effects of harvesting timber on forested wetlands is expected to be temporary. Under cable and helicopter yarding the primary effect is the removal of overstory trees. When regrowth occurs wetland function should be similar to preharvest conditions. Roads and units were located to avoid the highest value wetlands, such as beaver ponds and estuaries. Roads are often located away from wetlands due to the higher construction costs of additional shot rock and cross drains. A study is underway on Wrangell Island to evaluate the effects of road construction across a wetland.

Table 3-22 displays the miles of road to be constructed on wetlands and the acres harvested by alternative across the entire study area. An approximate road footprint is estimated by assuming that overlay road construction will have an average total road prism width of 25 feet.

Table 3-22, Wetland Acres Affected

	Harvest Area (acres)	Road Distance (feet)	Total Acres
Alt 1	116	0	116
Alt 2	138	37,750	160
Alt 3	157	19,900	168
Alt 4	146	10,460	150
Alt 5	202	30,365	219
Alt 6	0	0	0

Effects on Upland Sediment Sources

Alternatives 2 and 5 have the highest risk of sedimentation.

Alternative 5 poses the greatest risk for increasing upland sediment sources, followed closely by Alternative 2. Alternative 1 poses the least risk since it constructs no roads and all units are logged with a helicopter.

Partial harvest may lessen risk of slope failure.

Timber harvest and road construction create soil disturbances that add to the natural rate of soil erosion. Yarding practices that protect the surface organic layer will reduce soil erosion. Full suspension of the logs will be achieved with helicopter logging, greatly reducing the amount of soil disturbance. Rooting strength is a major factor contributing to hillslope stability on over-steepened slopes. After harvest, tree roots decompose resulting in a loss of slope stability. Partial harvest may lessen the risk of failure related to loss of rooting strength, although it is not known how much retention is needed to be effective.

Increased windthrow resulting from timber harvest can increase soil erosion risk. Small landslides are often associated with windthrow on steep slopes. Swanston (1974) found that the number of slide associated with roads and harvest units was three times greater than in undisturbed areas.

Prompt stabilization of cut and fill slopes will mitigate erosion during road construction.

An erosion control plan will be developed for logging and road construction . Surface erosion associated with road construction will be mitigated by prompt stabilization of cut and fill slopes. Site specific erosion control plans will be developed for all rock quarries to minimize soil erosion and sedimentation during and after construction.

Table 3-23: Harvest Acres by Alternative by Hazard Class
(includes unmanaged area within harvest units)

MMI	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
1	200	186	198	252	344	0
2	455	433	414	437	632	0
3	155	267	205	179	297	0
4	78	81	75	76	82	0

Table 3-24, Road Length (in feet) by Hazard Class.

MMI	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
1	0	46,393	34,393	25,521	50,237	0
2	0	9,066	8,420	1,434	10,309	0
3	0	2,812	0	0	5,679	0
4	0	0	0	0	0	0

Watershed Sensitivity

A watershed sensitivity model (McCorison et al, 1989) rates about 4270 acres of watershed tributary to the freshwater system as very sensitive due to a relatively high proportion of steep, unstable soils, alluvial stream channels, and dense stream network. The Honeymoon Creek and several small subwatersheds within Upper and Lower King George land units contain an inherently greater risk of erosion and sediment transport.

No alternative proposes harvest levels exceeding watershed thresholds.

As shown in Table 3-25, the watershed sensitivity model suggests a low harvest threshold for several watersheds. This table shows the maximum level of harvest proposed for any alternative, in this case, Alternative 5. No alternative proposes harvest levels exceeding the suggested threshold. All alternatives exclude harvest from the watersheds with the lowest thresholds.

Table 3-25, Watershed Thresholds

Land Unit	Watershed ID	Area (acres)	Suggested Harvest Threshold (acres)	Maximum Proposed Harvest (acres)
Lower King George	Q52B	660	130	0
Upper and Lower King George	Q52C	3,470	1,400	390
Lower King George	Q52D	1,100	220	60
Lower King George	Q53A	290	120	0
Honeymoon	Q59A	2,220	890	290

Although some alternatives pose a greater risk to freshwater systems, they all are expected to meet goals and implement standard practices to maintain water quality and fish habitat.

The dispersal of timber harvest across watersheds in combination with partial and selective harvest methods does not pose a risk in any alternative for measurably changing streamflow regimes in any watershed of the study area.

In summary, the action alternatives may be ranked for potential risk to aquatic habitat from highest to lowest as follows: 5, 2, 3, 4, 1. All alternatives employ Best Management Practices to minimize impacts on the freshwater system. All alternatives are expected to meet the goals of maintaining water quality and aquatic habitat.

Issue Four: Habitat Conservation

"Cumulative impacts must be considered in the EIS. This includes the old clearcut in Honeymoon, the slide area in King George, the Granite, Starfish, Olive cove sales and any other old clearcuts on Etolin as well as any future sales planned in the area."

"We are concerned that a sale of this size in two small watersheds will have serious impacts on fish and wildlife populations. This is the last large unfragmented area on N.Etolin and wildlife populations are effectively isolated from habitat on S. Etolin."

"The Forest Service has identified a volume class 7 stand which may be the only one of its kind on northern Etolin. The rarity of these stands requires that they be managed conservatively."

"It is encouraging to see a majority of units in some alternatives with silvicultural treatments other than clearcuts. Part of the reason for using other cutting methods is to maintain stand structure to provide better wildlife habitat after harvest."

"The effects of roading on marten, black and brown bears and wolves needs to be displayed and discussed in the EIS."

"What will be the effects on Goshawks, murrelets and other sensitive species?"

"Use of habitat capability models is presently the accepted way to analyze effects on wildlife."

This issue encompasses public and other agency concerns about impacts to the natural plant and animal habitat diversity occurring at various scales. Measures used to address the habitat conservation issue include: fragmentation; old-growth habitat retention; travel corridors; vertical forest structure and diversity; threatened, endangered, sensitive species, special interest species, indicator species and special or unique habitats.

Fragmentation

It is possible to fragment an area twice the size of actual harvest.

Habitat fragmentation is a process by which habitats are increasingly subdivided into smaller units, resulting in increased isolation of habitat blocks and loss of total habitat (Noss & Cooperider 1994). In Southeast Alaska this problem is magnified on islands. The formation of endemic species (species unique to an area) or subspecies is common in island systems, such as southeast Alaska (Suring et al 1993). Harris (1984) states that according to island biogeography, presence and persistence of wildlife species on true oceanic islands is governed by the size of the island, distance from mainland, and diversity of habitats on the island. Fragmentation on Etolin Island is caused by windthrow, landslides, natural topography and management actions.

For many years, forest managers have designed harvest units in staggered settings that result in a regular pattern of similar sized clearcuts with leave strips between the units. When viewed from the traditionally taught ideas of wildlife habitat management this pattern maximized edge habitats to the benefit of many wildlife species. Creation of an edge habitat was, and remains, a desirable habitat objective for many species. Recently, a broader perspective of wildlife ecology has recognized that certain groups of wildlife prefer forest interior habitats not affected by openings or abrupt edges created by timber harvesting. Research has shown that edge effects may extend up to two to three tree heights into the forest stand (Harris, 1984).

When viewed at a larger landscape scale this staggered setting harvest technique has fragmented many areas thus reducing the availability of interior forest habitats. Simulation studies have displayed that when as little as 50% of the forest in a watershed has been harvested in this manner, little if any forest interior habitat conditions remain. This could have long term negative impacts on old growth ecosystems and maintenance of plant and animal diversity.

Appendix A summarizes the results of an island-wide analysis on the possible fragmentation of large blocks.

To assess the current availability of old growth forest habitat necessary to provide for biodiversity and insure viable well-distributed populations of old growth associated species, large blocks of mature forest were mapped on Etolin Island. Appendix A displays the results of the Etolin Island analysis and displays the possible cumulative effects of this action along with past and foreseeable future harvest.

The study area contains one of nine large blocks of old growth on Etolin Island. Most of the study area is in its naturally occurring condition. Two harvest units are located in the beach fringe (old "A-frame" logging units). South of the study area is a mosaic of fragmentation types, both natural and man made. The Anita Bay area has been extensively harvested. Southward is the congressionally-designated South Etolin Wilderness where no timber harvests are scheduled to occur.

The potential cumulative effects of future harvest in the study area may vary greatly among the action alternatives. Alternatives that include roads are more likely to include future harvests with 30% or less of the trees retained, due to cable logging restrictions. We do not know what will happen in the future, but **Alternative 1** (which does not include roads) and **Alternatives 3 and 4** (which have shorter segments of road than **Alternatives 2 and 5**) have higher percentages of helicopter logging units. Generally, helicopter logging allows retention of more large trees, thus reducing fragmentation effects. There is no guarantee, however, that any of the alternatives will have fewer miles of roads, or less fragmentation, than any other alternative in the future.

Species Sensitive to Fragmentation

Several species occurring in the study area are sensitive to forest fragmentation and may require minimum patch sizes to remain viable. Table 3-26 displays acreage estimates of the minimum old growth patch size necessary for effective habitat use of several species and the acres of habitat in patches meeting the minimum size requirements in the planning area. All acres listed are interior old growth, defined as volume class 4 (>8000 bf/ac) or higher and at least 300 feet from an opening.

The largest block of old growth continues outside the study area to the south of Red Mountain face for a total of 5886 acres of interior old growth. Another large block of old growth continues outside the study area to the south of the Porcupine Land Unit for a total of 4661 acres of interior old growth. Since the study area is an artificial boundary, we based our analysis on the entire blocks (Figures 3-15 through 3-20).

Alternative 3 would maintain the most large patches of all action alternatives.

Alternative 6 would maintain the existing pattern of old growth in one contiguous block. **Alternative 3** would maintain the most acreage in patches meeting minimum requirements for most of the selected species. The amount of habitat available in suitable-sized patches decreases in **Alternatives 1, 2, 4 and 5**, in descending order.

Table 3-26, Estimates of Effective Patch Size (in acres) for Selected Species (and acres available under the various alternatives).

Selected Species	Patch Size*	1954 Acres	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
Goshawk	5,000	12,145	0	0	0	0	0	5,890
Sitka Black-tailed Deer	1,000	12,145	8,350	7,660	8,220	8,220	7,230	10,140
Marbled Murrelet	600	12,145	8,350	8,590	9,065	8,220	7,845	10,140
Hairy Woodpecker	500	12,145	8,350	8,590	9,065	8,220	7,845	10,140
Red-Breasted Sapsucker	250	12,550	8,865	9,000	9,335	9,055	8,730	10,550
Marten	180	12,550	9,050	9,000	9,335	9,055	8,950	10,550
Red Squirrel	30	12,710	9,350	9,280	9,480	9,240	9,255	10,700
Brown Creeper	15	12,710	9,365	9,320	9,525	9,280	9,295	10,700
Rating**			c	d	b	e	f	a

* Minimum patch size for optimum habitat
** Rating: a = least effect --- f = most effect on fragmentation sensitive species

Partial cutting will likely mitigate fragmentation in Chichagof Face and Red Mountain land units.

Fragmentation of the habitat in the planning area may concentrate deer in smaller, predictable blocks of cover, which would reduce predator search time (Suring et al 1992). Much of this effect will be mitigated by the alternative silvicultural prescriptions proposed in the alternatives especially on Chichagof Face and Red Mountain. Unless there are high levels of blowdown, many of the units will not create large openings or fragment large blocks of habitat.

Brown Creepers prefer large old growth trees. Brown creeper habitat is best in volume class 6 and 7. Other habitats in southeast Alaska are not considered to provide suitable habitat for brown creepers. The primary effect on brown creepers by the action alternatives would be related to reduction in high volume, old growth forests. Declines in habitat capability for brown creepers and other old growth associated species are expected to occur immediately following timber harvest (Table 3-26).

Figure 3-15: Alternative 1 Old Growth Blocks

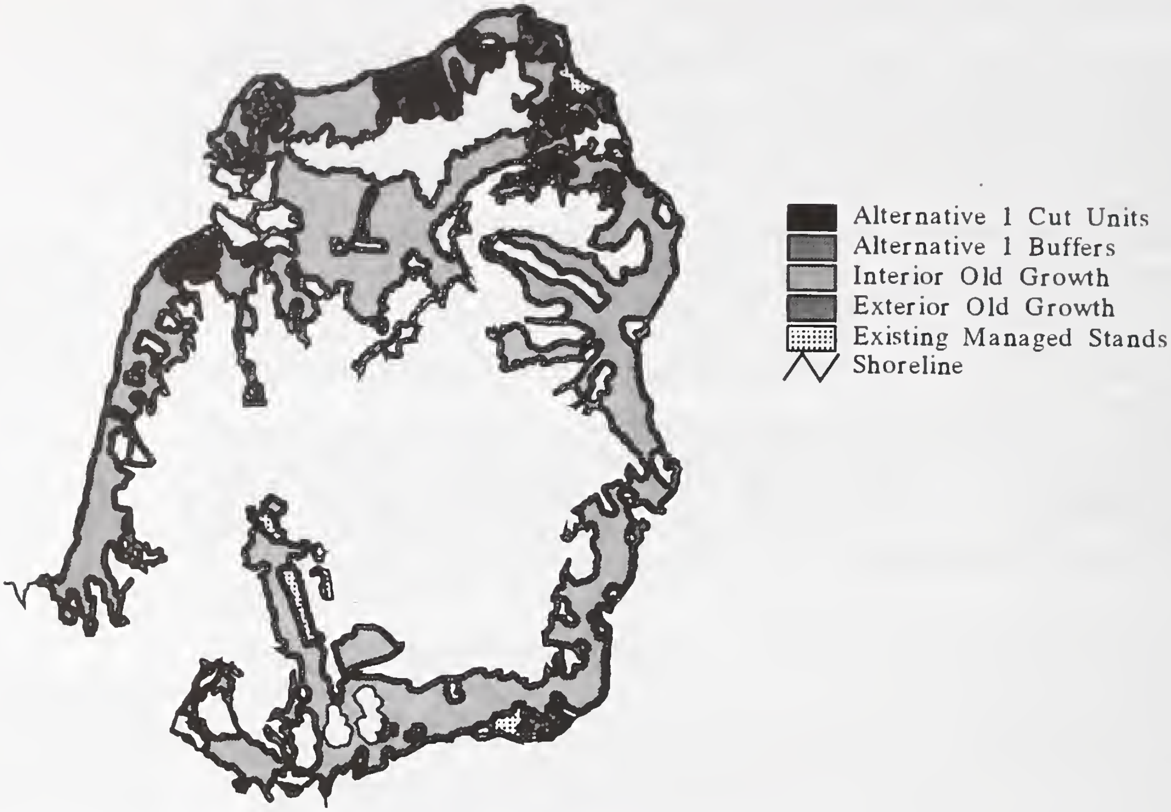


Figure 3-16: Alternative 2 Old Growth Blocks

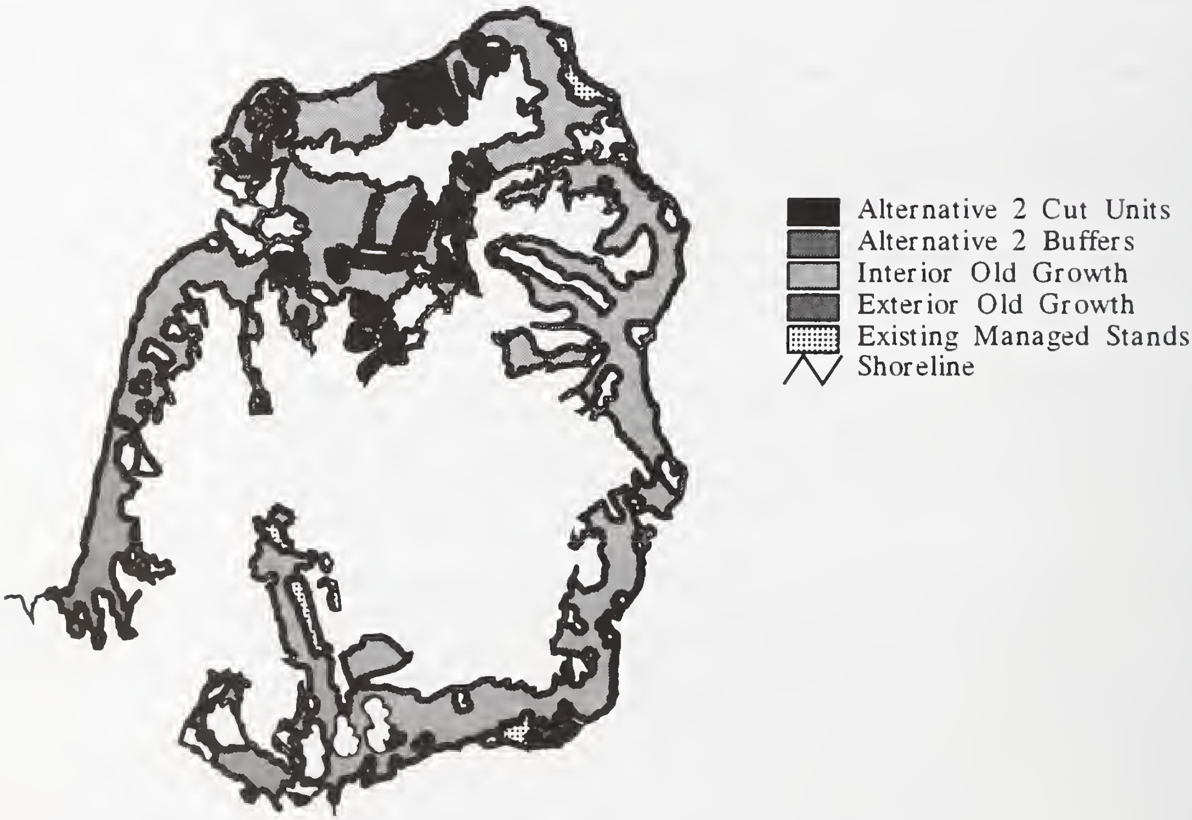


Figure 3-17: Alternative 3 Old Growth Blocks

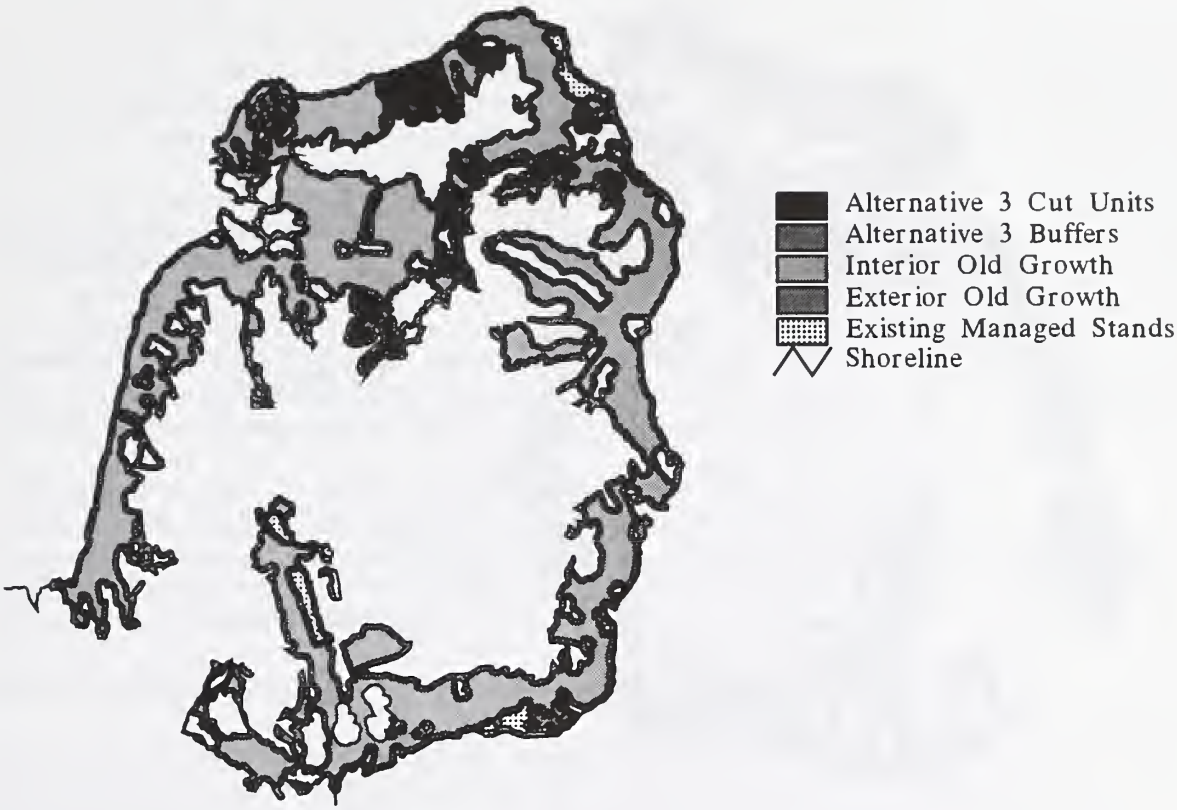


Figure 3-18: Alternative 4 Old Growth Blocks

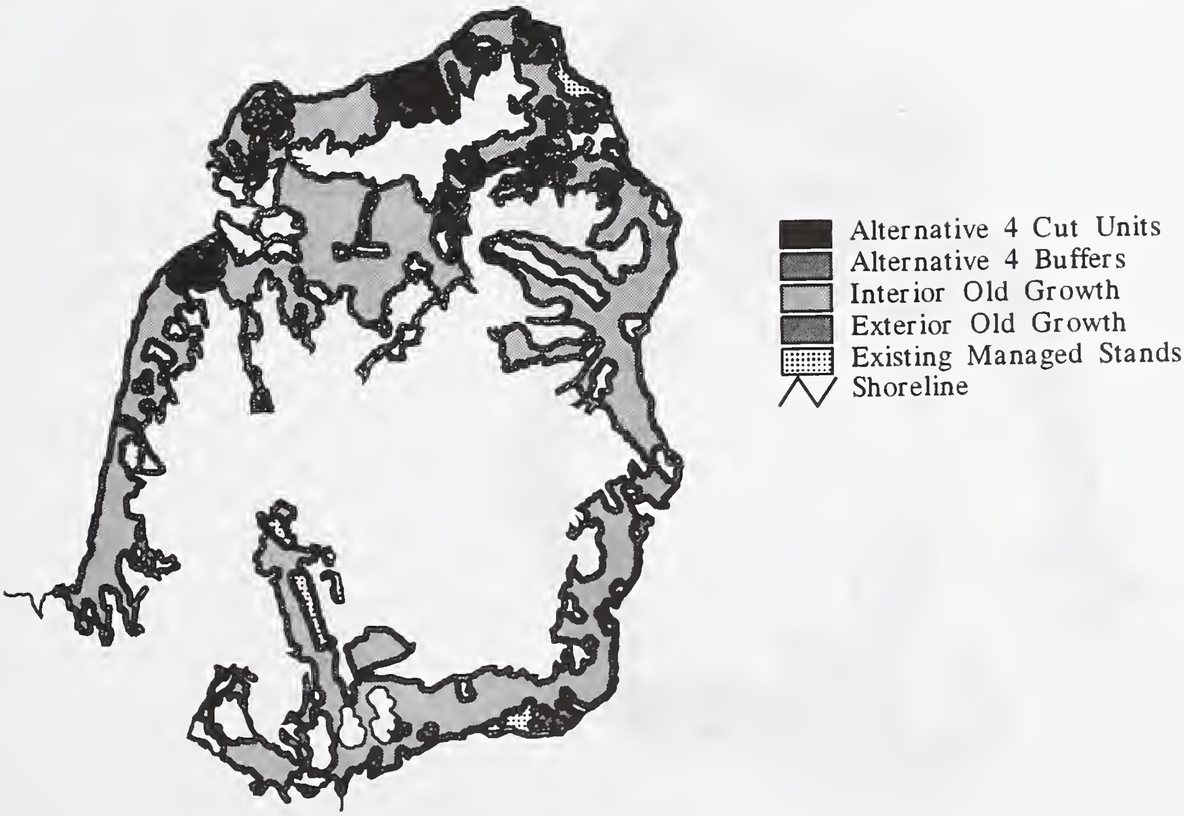


Figure 3-19: Alternative 5 Old Growth Blocks

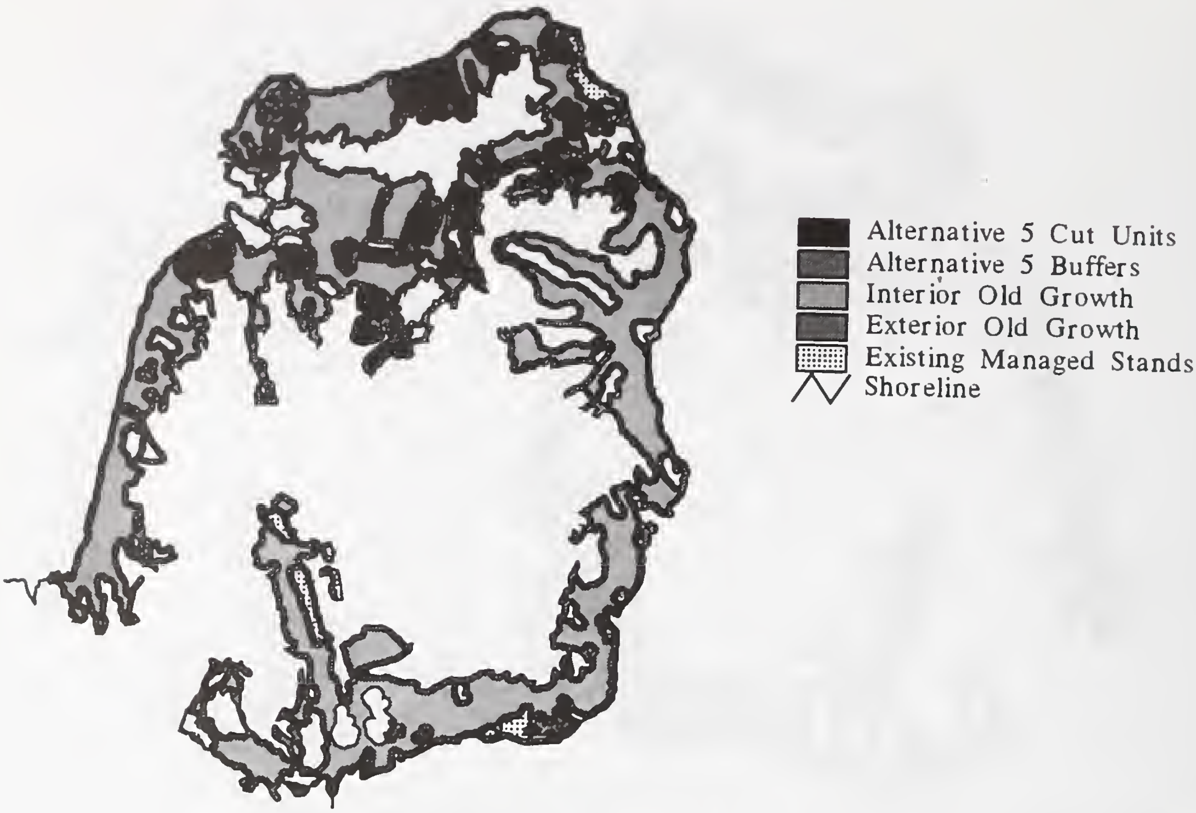


Figure 3-20: Alternative 6 Old Growth Blocks (Existing Condition

Old Growth Habitat Retention

Much of the old growth in the planning area will not be harvested during the first entry. The decision on which stands of old growth will remain unharvested will affect the habitat of many species of wildlife and will have implications for future population viability. Old growth habitats would be maintained in the planning area in three primary ways.

Old Growth habitats are maintained by:

- ***setting aside larger blocks in the King George and Red Mountain land units,***
- ***streamside, estuary and beach fringe habitats, and***
- ***no harvest on lands unsuitable for timber production.***

The first would be through meeting habitat retention requirements in the current Tongass Land Management Plan (TLMP). Retaining large blocks of old growth are especially valuable to wildlife.

The second major way in which old growth habitat would be managed is through the maintenance of stream side, estuary, and beach fringe habitats. Although these habitats usually will not be in block configurations, they will provide vital travel corridors between the old growth blocks along with thermal, hiding, and foraging habitat.

The third manner in which old growth habitat will be maintained is on lands that are unsuitable for timber harvest. These areas are either too steep to harvest without risk to site productivity or are not available for timber harvest under current technological constraints. All of the acres of the various habitats discussed are essentially in old growth condition and lay in a mosaic of habitat types.

TLMP Retention Areas

To help mitigate effects on wildlife, a system of retaining harvestable old growth for wildlife habitat was developed under the Forest Plan. Current TLMP direction for designating retention areas is as follows:

> "Areas allocated to retention should: meet objectives as designated by individual species, retention areas should not overlap, these areas should be placed in operable CFL (commercial forested lands - volume class 4 and above) and not be located on high hazard soils."

Table 3-27 shows the percentage and numbers of harvestable acres that must be retained for each habitat category. Figure 3-21 shows the location of recommended retention areas and the cutting units.

Table 3-27: Retention As Defined In TLMP For The King George Sale Area.

Code	Original Acres	% to Retain	Acres to Retain	Acres Retained/ Mapped
41 - bear beach	686	15%	103	108
42 - bear estuary	226	85%	192.	*139
43 - bear riparian	649	20%	130	130
45 - deer high elevation	4,951	5%	248	286
46 - deer low elevation	3,041	5%	152	190
48 - moose	853	15%	128	129
49 - furbearer upland	6,467	15%	970	970
50 - furbearer beach/riparian	1,525	20%	305	306
51 - landbird	7,992	5%	400	486
56 - low density eagle nest trees	281	65%	183	187
58 - high density eagle nest trees	438	100%	438	**342
Total	*****7,992**	**N/A**	**3,249**	**3,273**

* --did not meet bear estuary goal due to 18 acres of pre-TLMP logging and 69 acres allocation to high density eagle nesting retention (Code 58).
**--did not meet high density eagle nesting goal due to 96 acres of pre-TLMP logging
***-- not a column total due to overlap between types

Habitat Conservation Areas (HCA)

Habitat conservation areas (HCAs) are areas designed to meet minimum viable population demands for a selected group of wildlife species proposed in "A Proposed Strategy for Maintaining Well-Distributed, Viable Populations of Wildlife Associated with Old growth Forests in Southeast Alaska-report of an Interagency Committee" (VPOP) (Suring et al 1993).

Thomas et al (1990) provided general guidelines for the development of a conservation strategy based on the work of Diamond (1975), den Boer (1981), Harris (1984), Noss & Harris (1986), and Wilcove et al (1986). In the King George planning area, the interdisciplinary team (IDT) used most of those ideas for the overall landscape-level conservation strategy. While not designating "HCAs" the team has followed Stikine Area direction to design areas of old growth retention to maintain the viability of all dependent old growth species following recommendations in VPOP.

Habitat in the highest value land units was selected for old growth retention.

The Interagency Committee's report (VPOP) identified potential large and medium Habitat Conservation Areas, and recommended designation of small (1600 acres or more) HCAs by area planners. We analyzed three potential small old growth habitat retention areas in the Land Units of Honeymoon, King George and Red Mountain. The King George and Red Mountain Land Units have higher wildlife habitat value than the Honeymoon Land Unit and were therefore selected for the retention of old-growth. The Honeymoon unit contains the best site for a log transfer facility, which means a road is likely to bisect the block, thus reducing the effectiveness of the area as suitable habitat. We evaluated a possible network of large, medium and small blocks of old growth over Etolin Island (see Appendix A).

We suggested that some of the habitat retention requirements should be met in two blocks, one in the Lower King George Land Unit and the other in the Red Mountain Land

Unit. The team selected the Lower King George area due to the structural complexity, biodiversity and large, contiguous blocks of high volume old growth. The Red Mountain block will provide a link between old growth blocks in the planning area and old growth blocks to the south.

The Red Mountain block provides a link to possible old growth blocks south.

For purposes of this analysis, these old growth areas will be useful to evaluate effects of alternative application on the ecosystems in question, their dependent organisms, and potential biodiversity.

Figure 3-21: Retention in King George Study Area

The Red Mountain old growth retention area would have a harvest unit (unit 28) just north of it in **Alternatives 1, 4 and 5**. The harvest unit may separate the retention block from other old growth blocks in the study area, but would not otherwise affect its old growth habitat values. These old growth habitats will contribute to the abundance and variety of wildlife (biodiversity) on the island. The old growth retention area in the King George land unit would have some patch cuts north of it under all action alternatives (Unit 1) and there would be a road and cutting units along the southern edge under the proposed action, **Alternative 5 and 2**. The road and harvest units would reduce the value of the King George land unit retention area by fragmenting old growth adjacent to it, but would not otherwise affect habitat values within the old growth retention block. Closing the road after harvest would partially retain habitat values but it is likely that the road will still invite more use than under **Alternatives 1, 3 and 4.**

Travel Corridors

Travel corridors provide connectivity between blocks of old growth forest. Travel corridors that extend from north to south are especially important, due to the shape of Etolin island. Corridors are delineated and retained to help maintain the biodiversity of the area, reduce fragmentation and maintain travel avenues. When these important areas are found and cataloged, decisions are made concerning their importance. Several natural corridors occur in the King George area. The west side of the planning area supplies a habitat corridor to the rest of the island through its extensive beach fringe.

Low elevation passes are 'pinch points' to wildlife. There are three in the area.

A concern in the island geography of southeast Alaska is "pinch-points." One type is an area where two bodies of water come together leaving only a small isthmus of land (a bridge) almost bisecting an island. The same effect can be realized with natural corridors between drainages. These areas are natural funnels for migrating animal populations and many predatory animals may choose to hunt in such areas. Both types occur on Etolin, but only the second kind occurs on the study area, as low elevation passes.

The Kunk Lake pass in mostly unaffected.

Three low elevation passes are located in the project area. Two are timbered passes between the planning area and the next watershed south. The pass into the Kunk Lake drainage is timbered but, it connects to a large open area with a mixed conifer/muskeg complex. Stringers of timber occur in this muskeg complex, improving the value of this corridor. None of the alternatives would directly affect the pass itself, or the Kunk Lake drainage. Harvest units and roads created under **Alternatives 2, 3 and 5** would affect animal movement patterns on the east side of the pass, but the corridor should continue to be used. Under **Alternatives 2, 3, 4 and 5,** hikers and hunters might begin to use this corridor since road access may make it easier. This may result in occasional displacement of wildlife using the corridor, but human use is not expected to be heavy since people would still need to hike several miles to Kunk Lake.

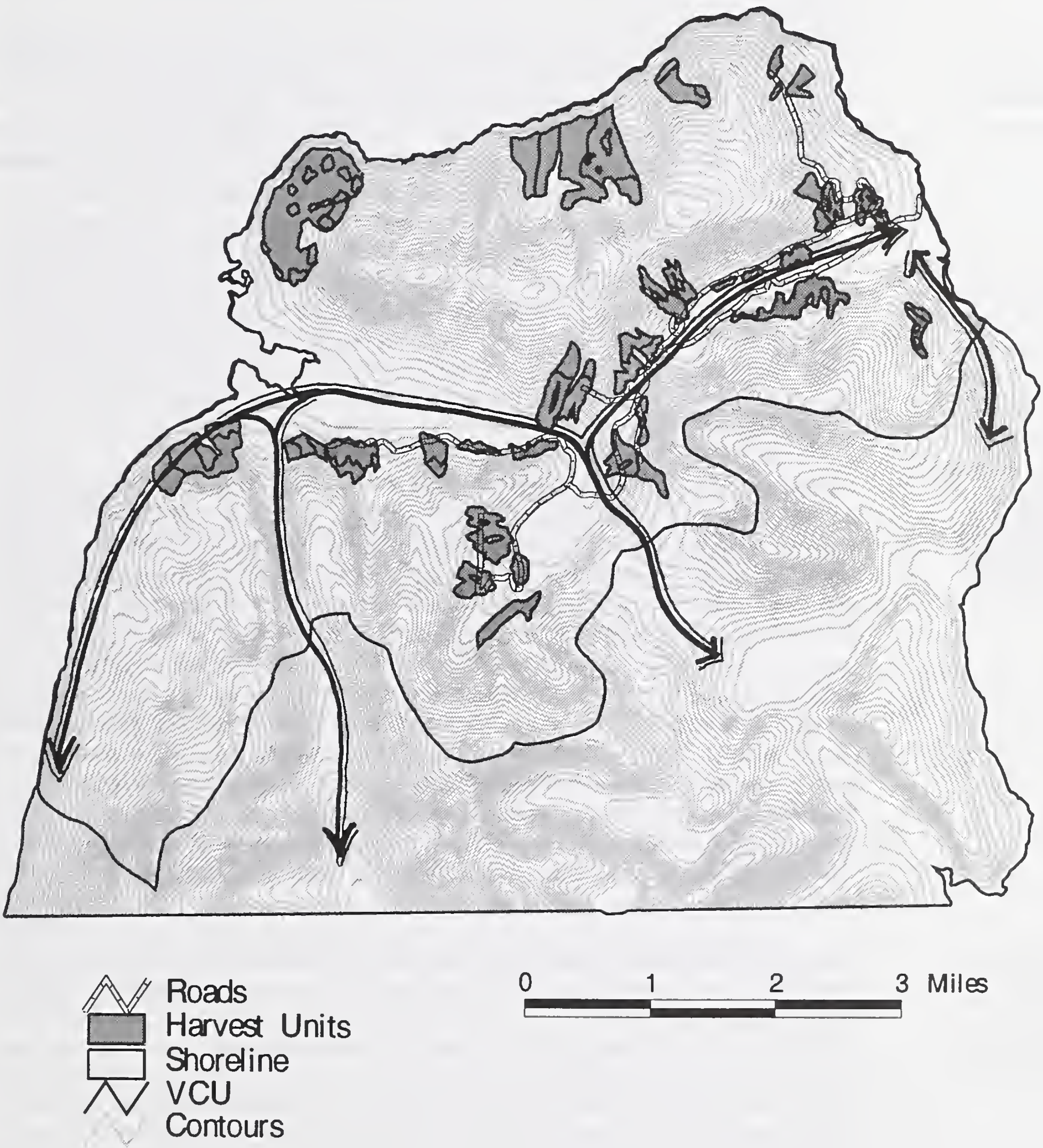
The Fishtrap pass is designated as retention and is unaffected.

The pass between King George and Fishtrap watersheds (south of the King George estuary) is well forested and would not hinder any of the species that would use this pass. Small mammals, amphibians and large mammals should find this corridor very accessible. This project would not affect the pass itself, or the watershed to the south, although past road construction and harvest in the Fishtrap watershed have already affected this corridor. **Alternative 1** would have the most potential impact, since Units 27 and 28 are near the corridor; however, the high amount of retention in those units should maintain the integrity of the corridor. Unit 28 is also included in **Alternatives 4 and 5**. **Alternatives 2, 3, and 6** would not have any effect on this corridor.

The third low elevation pass is located between the King George and Honeymoon Creek watersheds. The road location in the pass between King George and Honeymoon creeks impacts this corridor under all alternatives except **Alternatives 1 and 6.** Roads can be very disruptive to animal movements and mitigation measures, such as road closure or hunting and trapping restrictions, may help mitigate this problem. The road would be closed under **Alternative 5,** but the corridor would be disrupted by the many harvest units proposed. Road use and timber harvest, and impacts on the travel corridor, would increase with **Alternatives 4, 3 and 2,** in that order.

All roaded alternatives affect the pass between Honeymoon and King George Creeks. Road closures can help mitigate the effects.

Figure 3-22: Wildlife Travel Corridors in the King George Study Area



Overall Effects Related to Fragmentation and Travel Corridors

All alternatives help maintain the highest value block near the King George estuary.

Overall, the fragmentation effects are least in **Alternative 6** (no action) and increase in various ways in **Alternatives 1, 3, 4, 2 and 5.** The action alternatives tend to create more patches of smaller size than are found in the existing condition. All of the alternatives maintain a block of old growth near the King George estuary and include the same harvest units along Chichagof Face. The block of old growth near King George estuary has the highest value wildlife habitat in the study area for most species. Important habitat types in the old growth block include riparian and estuary fringes, south facing deer winter range, and corridors connecting the block to other old growth habitat. Therefore, the most important effects of fragmentation can be related to how the old growth block near King George estuary is affected.

Of the action alternatives, Alternative 1 maintains the most travel corridors.

Alternative 1 would maintain a larger block of old growth near the King George estuary than just the actual retention area, with only natural openings in the block. Corridors would be maintained to the Kunk Lake medium old growth retention block, the Honeymoon watershed and Chichagof Face. Corridors to Fishtrap watershed and Red Mountain would be interrupted by Units 27 and 28. Partial cutting prescriptions in Units 27 and 28 could result in continued travel through the units by many wildlife species. Alternative 1 would maintain the most acreage in blocks larger than 1000 acres and has the second highest rating for acreage maintained for species sensitive to fragmentation shown in Table 3-26. To compare the average size of the old growth blocks between alternatives, we used the weighted mean block size (Kramer, in press), which is defined as $\sum$ (patchsize/total forest area)*patch size. Alternative 1 would maintain the third largest weighted mean block size, 1960 acres, compared to 5380 acres in Alternative 6 (no action). No roads are proposed under Alternative 1, which helps minimize fragmentation and reduces disturbance in the old growth blocks.

Alternative 3 reduces fragmentation the best of all action alternatives.

Alternative 3 also maintains a larger block of old growth near the King George estuary than just the actual retention area. Corridors would be maintained to Fishtrap watershed and Red Mountain, allowing wildlife to disperse to and from the southern parts of Etolin Island, and a corridor would be maintained to Chichagof Face. Corridors to the Kunk Lake medium old growth retention block and the Honeymoon watershed are interrupted by harvest units and roads. Partial cutting prescriptions in Unit 17 could result in continued travel by old growth associated species through the unit and the corridor to the Kunk Lake old growth block. Of all the action alternatives, Alternative 3 would maintain the most acreage in blocks large enough to benefit the species sensitive to fragmentation (except Sitka black-tailed deer) shown in Table 3-26. Alternative 3 does not include any roads or harvest units in the lower King George land unit, which helps minimize fragmentation and reduces disturbance in the old growth blocks. Alternative 3 would maintain larger patches of volume class 7 than Alternative 1, but the patches of volume class 4, 5 and 6 would be smaller. Alternative 3 would maintain the second largest weighted mean block size, 3120 acres.

Alternative 4 minimizes disturbance to the King George watershed, compared to other action alternatives.

Alternative 4 would maintain a larger block of old growth near the King George estuary than just the actual retention area. Corridors would be maintained to the Kunk Lake medium old growth retention block, Fishtrap watershed and Chichagof Face. Corridors to the Honeymoon watershed and Red Mountain would be interrupted by harvest units and a road. Partial cutting prescriptions in Unit 28 could result in continued travel through the unit by many species, allowing wildlife to disperse through Red Mountain to and from the southern parts of Etolin Island. Alternative 4 would maintain larger patches of volume class 6 than Alternative 3, but the patches of volume class 7 would be smaller. Alternative 4 would maintain a weighted mean block size of 3120 acres. Alternative 4 would only

include road construction to the head of the Honeymoon watershed, which would minimize disturbance to the King George watershed during and after harvest.

Alternative 2 would maintain the old growth retention block near the King George estuary, but the harvest units in the lower King George land unit would result in a block that would be 900 acres smaller than what would be maintained under Alternatives 1, 3, and 4. Only the travel corridor to Chichagof Face would not be disrupted by harvest units. Retention in harvest Units 17, 18 and 26 and the King George riparian area could allow some old growth associated species to continue to travel to and from Red Mountain, Fishtrap drainage and the Kunk Lake medium old growth block. The road and harvest units would make dispersal to and from Kunk Lake less likely than under Alternatives 1, 3 and 4. Alternative 2 would maintain a larger block of old growth in the Honeymoon watershed and Zimovia Face than the other alternatives, but the block would be isolated from other old growth blocks, unless retention in Units 2 and 29 allow dispersal across Chichagof Face and south to King George. Alternative 2 includes road construction into the Lower King George land unit, but closing the road after harvests are completed would reduce disturbances to wildlife in the old growth retention block. Alternative 2 would maintain the most large blocks of volume class 4 and 7 of any of the alternatives. Alternative 2 would maintain a weighted mean block size of 1350 acres.

Alternative 2 would maintain the largest blocks of old growth in Honeymoon and Zimovia, but would reduce the size of the King George block.

Alternative 5 would maintain the old growth retention block near the King George estuary, but the harvest units in the lower King George land unit would result in a block that would be 900 acres smaller than what would be maintained under Alternatives 1, 3, and 4. Only the travel corridor to Chichagof Face would not be disrupted by harvest units. Retention in Units 17, 18, 26 and 28 and the King George riparian area could allow some old growth associated species to continue to travel to and from Red Mountain, Fishtrap drainage and the Kunk Lake medium old growth block. Alternative 5 would maintain a weighted mean block size of 1155 acres. The road and harvest units would make dispersal to and from Kunk Lake less likely than under Alternatives 1, 3 and 4. Alternative 5 includes road construction into the Lower King George land unit, but closing the road after harvests are completed would reduce disturbances to wildlife in the old growth retention block. Since most of the harvests predicted to be conducted in this 50 year period in the study area would be done immediately under Alternative 5, there could be a longer period of reduced disturbance than there would be under the continuing harvest possibilities of the other alternatives.

Alternative 5 has the greatest effect on fragmentation and corridors. It still maintains key habitats by:
- ***retaining the King George block,***
- ***retaining riparian areas,***
- ***closing most roads,***
- ***using partial cutting methods, and***
- ***retaining most of the Honeymoon stand.***

Vertical Structure and Diversity

Vertical diversity is characterized by the structure within a forest stand. Stands with trees all of the same age would have only one canopy layer and low vertical diversity. Stands with multiple layers (i.e. overstory, midstory, understory, snags, etc.) have high vertical diversity. Vertical diversity is important to wildlife, due to the increase in habitat characteristics or available niches. Vertical diversity generally increases as a stand goes through the various stages of forest succession. Harvest prescriptions that include retention of large trees are expected to leave more vertical stand diversity than traditional "even aged" management with clearcut practices.

Disturbance Factors

There are four natural disturbance factors in the area:
- *porcupines,*
- *landslides,*
- *yellow-cedar decline, and*
- *windthrow.*

There are primarily four natural disturbance factors that affect vegetation patterns in the study area: porcupines, landslides, windthrow and yellow-cedar decline.

Porcupines spend most of the spring and summer feeding on the ground. In the fall and winter porcupines spend much of their time in hemlock trees where they chew on the cambium layer in the inner bark. Trees that are not killed develop forks, and bole and butt scars which can introduce rot into the tree. By the time some hemlock trees reach maturity, the trees break at the location of the developing rot. Areas that have a lot of porcupine activity have jagged stumps, snags and lots of down logs which provide habitat for a variety of wildlife. There are usually lots of small openings with small hemlock trees regenerating. If the opening is greater than 1/4 to 1/2 acre in size, Sitka spruce may become established. Porcupines are affecting the entire study area.

Landslides or debris avalanches typically begin on hillslope depressions where groundwater is concentrated. Movement occurs when gravitational forces pulling overburden material downslope exceed the shear strength or resisting forces. Landslide debris is usually deposited at the bottom of the slope or on a bench leaving a trail of exposed soil. After a slide, red alder usually occupies the site at elevations below 1200 feet while Sitka alder usually occupies sites over 1200 feet in elevation. Gradually the alder die from being overtopped, snow breakage, or rot and are replaced by Sitka spruce, and sometimes western hemlock.

Yellow-cedar Decline has a largely unknown cause. The primary cause is likely an abiotic factor, probably associated with poorly drained soils or soil temperature. The decline began about 1880 on all sites but has not spread to new sites. Yellow-cedar growing on more productive sites is not declining. Smaller trees coming up under the declining canopy are mostly western hemlock. Most yellow-cedar decline areas will convert to western hemlock plant associations.

Windthrow occurs when shallow rooted trees are affected by strong winds. Patch size varies depending on the scale of the blowdown. Openings 1/4 to 1/2 acre in size will regenerate with hemlock. Larger openings will often regenerate to 70-80% hemlock, 15-25% spruce and 5-10% cedar. Large scale windthrow events result in stands that have 1-2 canopy layers. Smaller scale windthrow in a stand often results in several canopy layers.

Patches, Gaps, Feathering and Legacies.

Disturbance may create gaps that isolate forest patches. Whether a particular patch pattern and degree of fragmentation is beneficial or deleterious largely depends on the characteristics of the species using the landscape (Morrison, Marcot & Mannan 1992). For instance, marten are reluctant to cross openings and may be affected by the roads and harvest units, especially units with only 10% retention. Some effects of fragmentation can be mitigated for certain species, such as woodpeckers by leaving legacies and feathering the edges of gaps in the forest cover.

Legacies include large windfirm trees, snags and small green trees in the understory that survive natural catastrophic events such as fire or windthrow (Franklin 1989, Samson et al 1991). Legacies can be retained in harvest units by feathering a forest edge with selective trees along the unit boundary to secure the newly created forest edge against windthrow (Payne & Bryant 1994).

Feathered edges and legacies are designed into all harvest units to various degrees.

Feathering will channel wind above the forest canopy, thus lessening the chance of substantial losses due to windthrow. In addition, Ratti and Reese (1988) found that feathered edges result in lower predation rates on interior wildlife species than areas of abrupt edge. Legacies can also be retained within unit boundaries through patch cutting or individually marking trees for removal. In the marking guidelines, some large trees would be preserved throughout the study area to maintain red squirrel populations. Maintaining reserve trees consisting of high tree species diversity, and a representation of pre-logging tree size classes, is essential to provide foraging opportunities for bark-foraging species such as brown creepers.

Another important habitat component of forest blocks are snags for cavity nesting birds and mammals. Snags are dead trees at least 15 inches in diameter at breast height and 10 feet in height or higher (Reserve Tree Selection Guidelines R10-MB-215, 1993). The hairy woodpecker is important as a primary cavity excavator and probably, as such, is a keystone species. It creates habitat needed for other wildlife species through this cavity excavation process (Noble and Harrington 1977). Forty-two species of mammals and birds in southeast Alaska nest or den in tree cavities. Several of these species depend exclusively on cavities in the large diameter snags characteristic of old growth stands for nest and den sites. It is estimated that in southeast Alaska the snag dependent hairy woodpecker requires an average of 672 snags per 100 acres to achieve maximum population densities. The less snag dependent red breasted sapsucker requires approximately 160 per 100 acres for an optimum habitat. Based on Forest-wide plant association data, we expect there are currently more than 2,000 snags per 100 acres of forested habitat types similar to those of the King George planning area (Pawuk, W.H. and Kissinger, E.J., 1989).

Snags provide important marten den sites (Spencer, 1987). Marten use the tops of broken snags as resting sites in the summer and cavities in winter and summer. Preferred snags have been reported to range from 14 to a 49-inches diameter at breast height (d.b.h.) (Campbell, 1979, Simon, 1980, and Spencer, 1987). Large down logs are another important habitat feature. Marten use the spaces under the snow below the edges of large logs for hunting and travel routes.

Proposed Harvest in the King George Area tries to mimic different degrees of disturbance. For example:

We mimic the shapes, sizes, and degrees of natural disturbance with harvest methods.

A **clearcut** with 10% retention of trees resembles a large scale disturbance. Feathering or varying unit boundaries may help maintain wildlife habitat and help prevent blowdown of the harvest unit edge. In some units, we plan on leaving young healthy trees to provide a seed source for spruce and cedar. Clearcutting is the most effective way of reducing dwarf mistletoe and other diseases. Clearcutting has been the most common practice in southeast Alaska because it produces the highest volume of timber per acre.

The extended **shelterwood** with 30-50% retention of trees will resemble a large-scale disturbance, such as windthrow with a moderate amount of trees remaining. In the King George planning area this has less effect on wildlife and scenic quality than harvests with 10% tree retention.

Patch cuts simulate moderate levels of natural disturbance. This method can be used to create or maintain an uneven-age stand. Seed trees can be left within the openings to seed in a mix of species.

Group selection harvest methods simulate small scale natural disturbance. This method can be effective in maintaining an uneven-aged stand. Group selections range from 1/4 to 2 acres in size and generally maintain canopy closure over large areas. This technique may retain the value of forest stands as thermal cover for big game or reduce fragmentation of old-growth.

Single tree selection removes trees from several size classes. Openings are kept small, resembling natural scattered tree disturbance. Regenerated trees grow slower due to competition for nutrients and light. This method will predominately regenerate hemlock.

Only single tree and group selections that retain 70% of the trees would prevent fragmentation. Dispersed patch cuts may minimize fragmentation between stands.

Only the single tree selection and group selection harvest methods that retain at least 70% of the trees or acres have the potential to maintain enough structure to minimize within stand fragmentation. Dispersed patch cuts may minimize fragmentation between stands. However, since these techniques are experimental, our fragmentation analysis above modeled all harvest units as clearcuts. Leaving 30% of the trees will develop a two storied stand, while leaving 50% of the trees will develop a two or three story stand. All treatments will benefit some species of wildlife while having detrimental effects on others.

Forest Succession After Disturbance

Oliver (1990) describes forest succession as follows:

1. ***Stand Initiation Stage.*** After a disturbance, new individuals and species of plants (trees) re-colonize the site. Stands developing after a major disturbances are described as 'even-aged' stands, since trees are assumed to have grown shortly after the disturbance.
2. ***Stem Exclusion Stage.*** As the trees continue to grow, the forest canopy closes, limiting the amount of sunlight reaching the forest floor. New trees do not appear and some of the existing ones die. The surviving trees grow larger in height and diameter.
3. ***Understory Reinitiation Stage.*** As trees die or are blown down, limited sunlight reaches the forest floor. Forest floor herbs, shrubs and young trees again re-colonize and survive in the understory, although they may grow very little.
4. ***Old Growth Stage.*** As trees in the overstory begin to die, understory trees will replace them, resulting in a multi-aged forest, with multiple canopy layers, which typifies the "old growth" stage.

These stages (see Figure 3-23) are useful as a means of predicting the changes in vegetation structure that are likely to occur after timber harvest using alternative silvicultural prescriptions. We expect that removal of up to 30% of the timber in groups or patches will retain much of the vertical structure that is found in the "old growth stage". Retention of 30 to 60 percent is expected to move the stand into the low "understory reinitiation stage" and above 60% into the high "understory reinitiation stage". The "stand initiation stage" would occur with the 10% retention prescription.

About 64% of the forested land would remain unaffected through the end of the rotation. Alternative 5 would affect 33% (the highest percentage).

Effects on Wildlife Habitat

It is estimated that approximately 64 percent of the forested land in the study area would remain unaffected by timber harvest activities through the end of the rotation. The percent of affected habitat varies from 20 percent in **Alternative 1** to 33 percent in **Alternative 5** . The forested habitat affected would be in various age classes following timber harvest. These acres would provide varying wildlife habitat values as the forest

matures. Harvest of less than 30 percent of the volume is expected to have the least impact on most interior and old growth dwelling species. Maintaining multiple age classes and vertical structure within the stand should help the habitat return to its natural state much sooner, and in fact, mimics the natural windthrow events that are prevalent in southeast Alaska. The various harvest prescriptions will leave a mosaic across the landscape that will look similar to the naturally occurring landscape patterns.

In clearcut timber harvesting, forage production increases due to sprouting vegetation. This increases the quantity of forage, but not necessarily the quality or availability of forage. Under intermediate and deep snow conditions, deer will select those habitats that provide for snow interception and food availability. The combination of a dense canopy with scattered openings in old growth forest types allows forage growth under openings while the canopy modifies snowfall sufficiently to promote forage availability and movement of deer. The nutritional value of plants grown in partial shade is also higher than that of plants grown in full sunlight (Hanley, et. al. 1989).

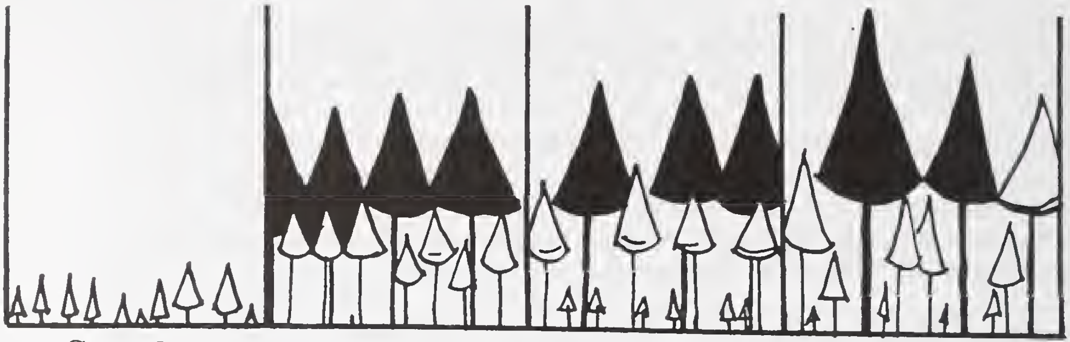
Breaking up a continuous forested habitat by clearcutting has the potential to increase bear populations by creating foraging areas with abundant preferred foods (Erickson, 1965; Meehan, 1974) during the "stand initiation stage". The increased food supply on any given clearcut is short-lived. Canopy closure during the "stem exclusion stage", at age 15 to 30 years severely reduces available food supplies. Bear population increases caused by logging may be expected to decline as second-growth stands enter the phase of least forage production (Meehan, 1974).

Maintaining a balance of accessible foraging areas and old growth habitats over time can benefit larger game species.

Precommercial and commercial thinning prolong forage production by opening the canopy of the young stands. During the "understory reinitiation stage", hiding and thermal cover values of the maturing stand will increase. Finally, in the "old growth stage" the forest returns to the multi-layered forest conditions most people describe as old growth with the large, old trees dying and being replaced by other trees in the understory.

In prescriptions that leave varying amounts of overstory, these changes are expected to be drastically different. In some cases, for example a 70 percent tree retention, we do not expect the difference to be noticeable, since much of the vertical structure will be maintained. In others (i.e. 40 percent or less stand retention) conditions will differ and effects will be noticed for some animal species but not for others. Presently we cannot quantify these differences, but we can predict some animal species response to the treatments. For example, marten will reduce use in areas with more than 70 percent of the overstory removed and will not cross clear areas greater than 100 feet. We also know deer utilize habitats where forage production remains even if portions of the overstory have been removed, either through natural occurrences (i.e. windthrow), harvest, or thinning activities. At Thomas Bay (located about 45 miles north of the study area on the mainland), deer and moose use have increased in partially cut units. "Both deer and moose showed similar trends in spring pellet-group counts with the lowest densities occurring in the old growth controls and the highest densities occurring in the 40 percent partial harvest" (Doerr, 1995).

Figure 3-23: Schematic Stages of Stand Development following Major Disturbance



Threatened, Endangered, Sensitive and Special Emphasis Species

This project will not affect threatened or endangered species.

Biological Assessments were conducted to evaluate the effects of the proposed action on federally-listed threatened or endangered species. The Biological Assessments were submitted to the Fish and Wildlife Service for the American peregrine falcon and to the National Marine Fisheries Service for the humpback whale and Steller sea lion. Both agencies concurred with the findings of no significant adverse effects to these listed species.

Consultation with the Fish and Wildlife Service and National Marine Fisheries Service during preparation of this document identified no inventoried resident threatened or endangered species in the project area. The American peregrine falcon passes through the Forest during spring and fall migration flights but is not known to occur on the area.

Humpbacked whales and northern (Steller) sea lions both reside in the waters next to Etolin Island. The National Marine Fisheries Service has listed these species as endangered and threatened respectively under the Endangered Species Act of 1973. One known haulout for sea lions has been identified north of the King George estuary. This is a winter haulout and no rookery activity has been associated with it. No known rookeries occur on the Wrangell Ranger District and no impacts from the timber harvest or related activities are expected.

Sensitive Species

Biological Evaluations (B.E.) are completed for any project that has the potential to affect a regionally listed sensitive plant or animal species. Biological Evaluations require biologists to provide written documentation of their judgments about whether or not a proposed management action will increase the likelihood of sensitive species becoming threatened or endangered. A summary of effects on sensitive plant species is located under "Other Issues" at the end of this chapter.

The following species have been classified as sensitive on the Tongass National Forest and may occur in the analysis area: Peale's peregrine falcon, osprey, Queen Charlotte goshawk, and trumpeter swan. Only the goshawk is expected to occur in the analysis area for extended periods of time.

Goshawk

Goshawks are raven sized raptors associated with forests having tall dense canopies. Goshawks hunt beneath the canopy, typically foraging over a range from 6000 to 8000 acres (Crocker-Bedford, 1990). Goshawks seem to use a mosaic of habitats throughout southeast Alaska. Productive forest types are important to nesting success. No known successful nesting has occurred outside productive old growth forest types (Volume Class 4+) in southeast Alaska. However, these productive forest areas need not be large and a mosaic of habitat types may be more important. Edge habitats may not be avoided and it seems alternative silvicultural activities do not prevent goshawk use of an area. Over 40 percent of all habitats used by goshawks are in areas of productive old growth forest types not suitable for harvest activities (Iversen, in publication).

Goshawks are uncommon in this region and there is an apparent association between timber harvest activity and decreasing goshawk nesting habitat. The northern extent of the Queen Charlotte Goshawk range is the Taku River in southeast Alaska (Webster, 1988). Eighty-one percent of the confirmed and probable nest sites in southeast Alaska are south of Frederick Sound (Queen Charlotte Goshawk Statue Report for R10 Sensitive Species Consideration, USDA Forest Service, 1991).

Field surveys have not confirmed any goshawk nests.

Field surveys in portions of the King George study area were completed in 1993, 1994 and 1995 field seasons, following the Regional protocols for the northern goshawk. Surveys were conducted before some of the proposed harvest units were designed, so many units were not surveyed. There were survey points in units 1, 6, 28 and 29 and near units 3, 4, 5, 17, 20, 22 and 26. No goshawks were found during the surveys.

A goshawk was observed in the analysis area in 1994. No known nests have been recorded in the analysis area. There is a known nest site south of the study area. Unit 19 is the closest to that nest (within 34,000 feet or 6.4 miles). Other units (15, 20 - 28) are also within the proposed nest buffer area (Goshawk Environmental Assessment, in preparation).

Alternatives 2 and 5 harvest an area that may have a goshawk nest. Field surveys are planned in the area in 1996.

Evidence of a possible nest area was found near a unit that was not surveyed, after the breeding season in 1995. The suspected nest may be in one of the units proposed to be harvested with 10, 30 and 50% retention under **Alternatives 2 and 5**. If surveys during the 1996 breeding season verify an active goshawk nest, current direction, which is the "Interim Habitat Management Recommendations for the Northern Goshawk, Tongass National Forest 1992" will be initiated. Mitigation measures include no vegetation manipulation in a 20-30 acre nest area, which would eliminate a harvest unit in

Alternatives 2 and 5. Mitigation measures also prescribe a 600 acre post fledging area where created openings are less than 20 acres, which could alter silvicultural prescriptions for 2-4 other harvest units. If these mitigation measures are implemented, it is not likely that any of the proposed alternatives would affect goshawk population viability or tend to make the species more likely to be listed as Threatened or Endangered.

Silvicultural prescriptions should help maintain goshawk habitats in the study area.

The range of silvicultural prescriptions should maintain goshawk habitats throughout the study area. Varying degrees of forest structure should be maintained in most of the proposed units over time. Small areas will be reduced in habitat value, but they should return to suitable habitat in a short time. **Alternative** 6 would have the least effect on habitat. Of the action alternatives, **Alternative 1** would have the least effect on goshawk habitat, followed by **Alternatives 4, 3, 2 and 5** in order of increasing effects.

Special Emphasis Species, Marbled Murrelets

Marbled murrelets are listed as a threatened species in Washington, Oregon and California and attention to this special emphasis species is increasing in Alaska. The marbled murrelet is a robin-sized seabird that is found throughout the North Pacific. It feeds in near-shore ocean areas, inland saltwater and occasionally on inland freshwater lakes. The bird feeds below the water's surface on small fish and invertebrates.

Marbled murrelet habitat requirements' are not well established for southeast Alaska. It is known that marbled murrelets usually nest on high branches of large trees, often far from water. Many large trees with lichens and moss on their limbs occur in the King George planning area and provide potential habitats for nesting murrelets. Some trees in the analysis area have been damaged by porcupine feeding and wind-snap. This has produced potential perch and nesting habitat for marbled murrelets.

There are no nest records of marbled murrelets on Etolin Island. However, since marbled murrelets nest on high branches of large trees they are difficult to detect. During the 1993 and 1994 field seasons, surveys were conducted in high probability areas (Honeymoon estuary and King George estuary) using Paton et al 1990, guidelines for surveying marbled murrelets in forested sites. Marbled murrelets were observed flying and circling over the planning area at both drainages. Twenty-nine murrelets were observed in three days of surveys in 1993. Their behavior may indicate nesting in the study area.

Silvicultural prescriptions maintain trees with larger limbs, which are important to marbled murrelet nesting.

If a nest site is found, it is recommended that a 30-acre radius buffer surrounding the nest be provided. Roads can enter this buffer if unavoidable, but every effort should be made to protect the nest site. It is known that marbled murrelets prefer late-successional forested stands or old growth, with large diameter limbs covered with moss and lichen for nesting areas. With the silvicultural prescriptions used in this Environmental Impact Statement, such trees will be retained to varying degrees in most treatment areas, possibly mitigating many of the effects on murrelet habitat.

Category II Species

Category II species are taxa for which the USFWS has information that indicates that proposed listing as threatened or endangered is possibly appropriate, but persuasive data on biological vulnerability and threat are not currently available to support proposed rules. This means that more information is needed and when gathered, some of the species may drop off the list, or some species could be designated threatened or endangered. The goshawk, which was discussed in the sensitive species section and marbled murrelet, discussed under special emphasis species, are Category II species. The gray wolf, spotted

frog and harlequin duck are Category II species that were discussed in the wildlife specialist report. The procedures outlined by the Endangered Species Act of 1973 will be followed if the gray wolf, spotted frog or harlequin duck is listed for protection. TTRA buffers along with beach fringe and estuary fringe buffers should adequately provide for harlequin habitat protection. Spotted frogs have not been found in the analysis area and we do not expect significant adverse effects on any frogs that may be present.

Effects on wolves increase with the number of open roads.

Based on the analysis of the effects on prey species, we anticipate that the silvicultural prescriptions proposed for this planning area will result in little disturbance to wolf populations. However, with the potential increase of human use in the area due to the new LTF and roads, harvest of wolves on the King George area may increase. The amount of increase in wolf harvest will vary according to the number of road miles and post-harvest management planned for the roads in the various alternatives. The alternatives with the most miles of road will have the greatest potential to increase wolf harvest. Road closures would reduce the potential wolf harvest; however, we anticipate that most of the potential harvest will be incidental take by people hunting other game species, and even closed roads provide walking corridors that will be used by increasing numbers of hunters. The no action alternative would have the least effect on wolves, followed by Alternatives 1, 4, 3, 2 and 5, in order of increasing effect.

Management Indicator Species

Several "Management Indicator Species" (MIS) were identified for additional evaluation. These species are termed indicator species due to their importance to the ecosystem and humans, and as an indicator of habitat quality. A species can be called an indicator species for a variety of reasons. They may be threatened or endangered; commonly hunted, fished and trapped; or non-game species of special interest. Most importantly they represent a variety of other species with similar habitat requirements. This is consistent with the National Forest Management Act that requires that management indicator species be identified for each national forest and be used for environmental analysis.

Models are used to evaluate effects on several other 'indicator' species.

The species selected include: Sitka black-tailed deer, black bear, marten, red squirrel, hairy woodpecker and brown creeper. The habitat types represented by the Management Indicator Species are shown in Table 3-28. Bald eagle and otter were not chosen because management activities will not affect their habitats. The ability of the study area to support the selected indicator species was analyzed using a Geographic Information System (GIS) computer habitat capability models developed for the Tongass Forest Land Plan (TLMP) revision effort. These models provide an objective method for habitat evaluation and displays the effects of proposed management activities.

The no-action alternative, would have no direct effect on any Management Indicator Species and would maintain the habitat in its present condition. All proposed action alternatives include harvesting, and most include road construction, in wildlife habitat of various quality. Many proposed harvest units are common to two or more of the action alternatives. The spatial locations of impacts shift throughout the analysis area as harvest units are added or subtracted by alternative. Additionally, the use of prescriptions other than clearcutting are likely to reduce major impacts on the suitability of that habitat.

Due to model limitations, and to allow for the possibility of natural events such as blowdown in partial cut units, we modeled all harvest activity as a clearcut. Thus, the reductions listed here are used as a "worst case scenario". We predict that there will be

We modeled all units as 'clearcuts', but expect less effects as a result of partial cutting.

greater use of partial cuts by Management Indicator Species than of clearcuts, so we expect less impact under the unevenaged prescriptions than have been modeled here.

Habitat suitability analysis was performed on two data sets to assess the distribution of old growth forests on North Etolin Island; TIMCLU and Thematic Mapping based vegetation maps. Habitat suitability index (HSI) models were run on each data set for the six selected indicator species to compare differences both in total suitable habitat, and the spatial distribution of that habitat. There was little difference between the outputs based on whether Thematic Mapping or TIMCLU was used. Therefore, only the final TIMCLU based HSI scores are reported here. A more complete discussion can be found in the wildlife specialist report.

Use of The Model for Alternative Comparison

We have assumed that a reduction in HSI scores is directly related to a reduction in carrying capacity. To understand the effect of habitat changes on populations, HSI scores need to be linked to mortality, natality, habitat patch size, emigration and immigration estimates. Furthermore, to predict a future population, information on the population's current density and age and sex composition is also required. In short, we are unable to predict wildlife populations into the future, except in the most general of terms.

Wildlife models, are best suited for comparison of alternative land management proposals. Model outputs should be viewed as an index of risk used to rank planning alternatives. For example, the statement "the model predicts a habitat capable of supporting 324 animals in Alternative 1" would be misleading. This implies that the model has displayed the ability to predict habitat capability for animal numbers. Conversely, the statement "of the five alternatives, Alternative 1 has the highest habitat capability score" is more useful. This correctly implies that habitat features associated with animal use will be more abundant in Alternative 1.

Models used as a tool for management decisions are important. They should be recognized as only one of several sources in the analysis process to identify specific project effects. Knowledge concerning each species and their various habitat needs improves with field validation over time and adds to the reliability of model predictions.

Table 3-28: Wildlife Management Indicator Species for the Study Area

Species	Habitat Feature and Primary-Use Zones
Black Bear	Sensitive to human interaction; Both black and brown bears (limited numbers) inhabit the study area, use a variety of habitat types for forage, denning, and cover. Beach fringe, estuary, riparian and upland old growth are of special importance.
Hairy Woodpecker	Primary cavity excavator; mature uneven age stands with many snags; Saltwater influence zone, upland forested old growth are important zones.
Marten	Important furbearer representing upland forested old growth; forest with large snags, and downed logs for dens and prey habitat; sensitive to fragmentation and human access; Beach fringe, riparian and upland forested old growth are important ecological zones.
Red Squirrel	Old growth Sitka spruce is considered optimum habitat in southeast Alaska. Middens are consistently located in close proximity to large diameter Sitka spruce. Snags are used for dens, and downed logs for food caches. Upland mixed-conifer type habitat can also be important.
Sitka Black-Tailed Deer	Is one of the ungulates present within the study area, the other two are moose and transplanted elk. Deer are an important game and subsistence species and an indicator for: low-moderate elevation, multi-canopied forest with forbs and blueberry in the understory; Low elevation forest, riparian, beach fringe and south-facing upland slopes.
Brown Creeper	Old growth >30,000 mbf, western hemlock and Sitka spruce highly preferred habitat. Nests are placed between the bark and truck of dead/dying trees (snags); Foraging occurs primarily on live trees; Studies indicate these birds are highly sensitive to clear-cut harvest patterns.

Effects on Management Indicator Species

Comparative results show little difference in habitat suitability for the six indicator species among the five action alternatives. In Table 3-29 you will notice that in all cases **Alternative 5** has the most impact of the action alternatives. In most cases Alternative 1 has the least impact but in some cases there is no noticeable difference between several alternatives.

In most cases, Alternative 5 has the most impacts on wildlife, and Alternative 1 has the least of all action alternatives.

Alternatives 5 and 2 would also have the most impact on some Management Indicator Species due to the roads that would be constructed. Roads would increase human access to the area, which would increase the vulnerability of hunted and trapped species. Vulnerability would be highest in roads through openings, such as clearcuts and muskegs, where the animals are more visible to hunters and other predators. The use of All Terrain Vehicles (ATVs) for hunting is increasing in popularity and these vehicles are being transported on personal boats to the roads on Etolin Island south of the planning area. Thus, we can expect ATVs to be used on roads in the planning area for hunting and other recreation.

Figure 3-24: Deer HSI

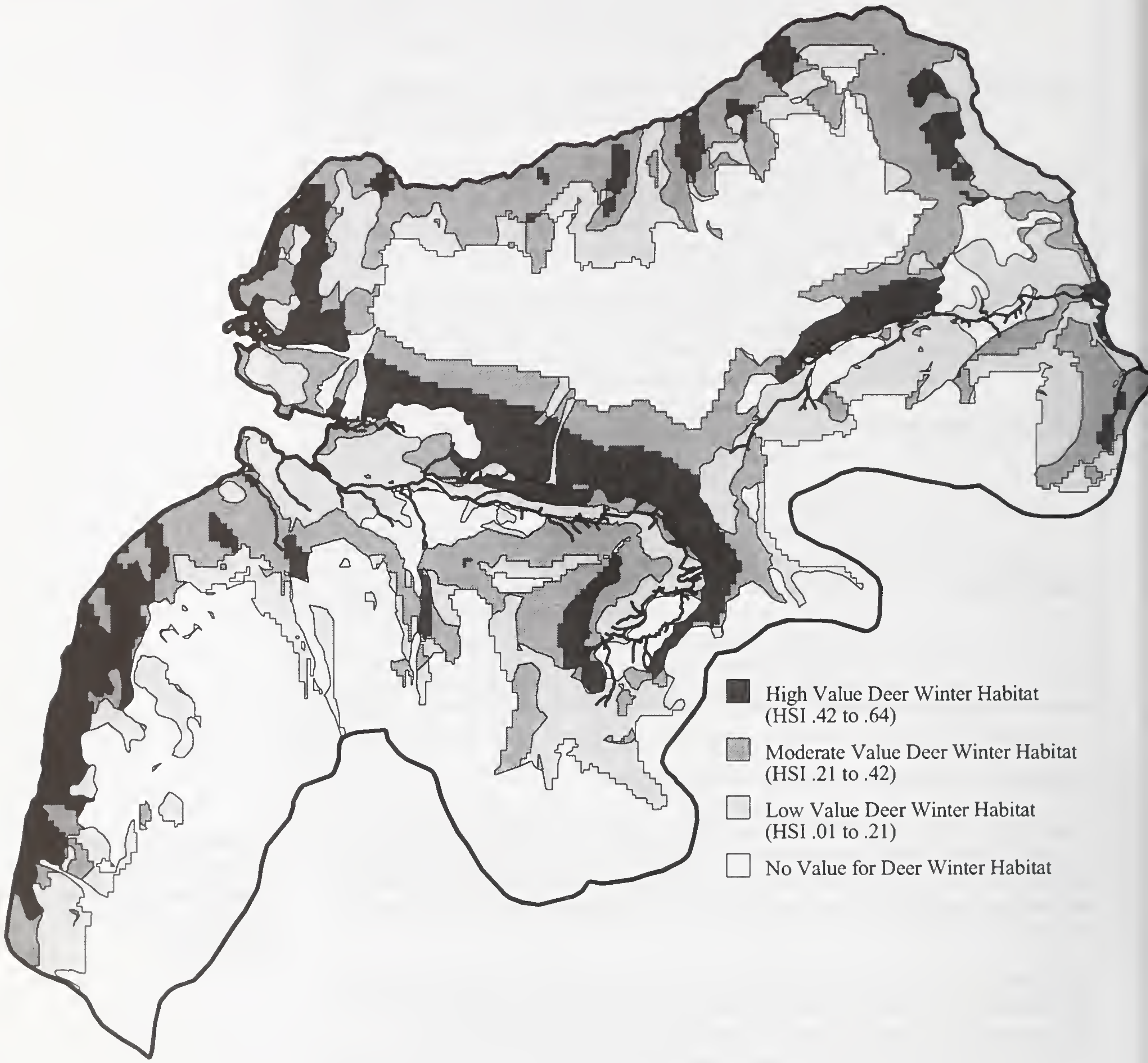


Figure 3-25: Marten HSI

Decisions about road management following harvest can have an equal or greater effect on some species than harvesting the trees.

In the past, logging roads on islands without ferry access usually became impassable, due to the growth of alder, after a decade or two without use. As the use of ATVs increases, and more people begin transporting them on boats, the use of logging roads may become frequent enough to prevent the vegetation from closing the roads. We do not know if that will occur in the King George planning area, but there is a possibility of increased access being maintained over an extended period of time and consequently, increasing demand for deer, bear and marten to harvest. Although there may be some long term changes in access, we do not expect that the increased access would reduce harvests below historic levels, and the habitat capability should be sufficient to meet some, if not all, of the increased demand for deer. **Alternative 1** would not require road construction and therefore would have the least effect on deer vulnerability, followed in order of increasing effect by **Alternatives 4, 3, 2 and 5**. Since **Alternative 2** includes the same road system as **Alternative 5,** it is foreseeable that future harvests (cumulative effects) will result in the same HSI values for the two alternatives. In fact, if future entries are planned for all alternatives, depending on how soon future entries occur, there may be little difference among the alternatives when cumulative effects are considered. Since **Alternative 1** does not include road construction, it is the least likely to resemble **Alternative 5** in the future, but there is no guarantee that roads will not be constructed for future entries.

Table 3-29: Habitat Capability as a percentage of the current condition

Species	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
Deer	97	94	96	96	92	100
Marten	95	94	95	95	90	100
Black Bear	99	99	96	96	96	100
Red Squirrel	96	95	96	96	92	100
Hairy Woodpecker	91	88	90	90	84	100
Brown Creeper	97	90	95	96	86	100
Rank	**b**	**e**	**d**	**c**	**f**	**a**

*Rank: a = least impact f = most impact

Effects on Special or Unique Habitats

Alternatives 2, 3, and 5 may have indirect effects on the beaver ponds from road access.

Beaver Ponds- None of the alternatives will directly impact the beaver ponds located in wetland habitat at the head of the King George watershed. However, indirect effects may occur from **Alternatives 2, 3 and 5** since these alternatives construct roads near this area. Beavers are often attracted to culvert inlets as dam sites. Resulting ponds may attract other wildlife species (such as geese). As discussed in the freshwater system section, oversizing culverts, use of bridges and removal of culverts after logging may limit this effect. Increased access provided by roads may increase opportunistic taking of beavers or other wildlife. **Alternatives 2 and 5** close roads near this area, but **Alternative 3** leaves the entire road system into Upper King George open. **Alternatives 6, 1 and 4** have the least effects on the beaver pond habitat.

Honeymoon Stand- Within the Honeymoon Creek watershed there is a stand of Volume Class 7 timber (highest volume class with large trees). on the south-facing side. There are some small areas of Volume Class 7 timber left on the Wrangell Ranger District but this is the only upslope stand not in a riparian area. There is another Volume Class 7 riparian stand in the King George watershed which is designated to be retained as old-growth.

Often Volume Class 7 stands are designated because they have a large number of trees per acre. The Honeymoon stand is designated because of the number of large trees per acre. This stand has 3 to 4 canopy layers with large Sitka spruce in the top layer ranging in diameter from 30-60 inches 5 feet above the ground. They are estimated to be 230-450 years old from cores taken inside the tree. Tree heights are 160-185 feet. The second canopy layer is composed of western hemlock and some yellow-cedar, which range in diameter from 18-30 inches and are estimated to be 180-240 years old. This second canopy layer ranges from 70-160 feet. Most of the western hemlock has bole rot. The third canopy layer is composed of western hemlock, with small amounts of redcedar, yellow-cedar and red alder. Diameters range from 6-18 inches and their height is 30-70 feet tall. A small portion of the area has a fourth canopy layer of small western hemlock seedlings and saplings. Brush species include blueberry (26-45% cover) devils club (0-25%), rusty menziesia (0-25%), skunk cabbage (0-25%) and twisted stalk (0-25%).

All alternatives minimize fragmentation of the Honeymoon stand. Alternatives 4 and 5 harvest the most of it (24 acres).

The Honeymoon stand is 65 acres in size. Possible impacts of harvesting this stand include the further loss of representations of this type of habitat and loss of deer winter range values if the stand is fragmented. The following describes the impacts on this stand by Alternative:

- **Alternative 1-** Does not construct road through the stand and harvests 11 acres. Fragmentation of the stand is somewhat minimized by harvesting on the east side of the stand.
- **Alternative 2-** Moves the road to the south side of Honeymoon Creek and avoids this harvest and road development in this stand. Effects are similar to Alternative 6.
- **Alternative 3-** Harvests 7 acres of the stand. Fragmentation is minimized by harvesting the 7 acres below the road.
- **Alternative 4 and 5-** Have the same impacts by harvesting 24 acres of the stand. Again, fragmentation is minimized by logging the portion below the road.
- **Alternative 6-** No impacts, the stand would likely remain intact with eventual loss of trees in the second canopy layer. Gaps would be filled by western hemlock in the third canopy layer.

South Facing Slopes- South-facing slopes in the King George study area provide thermal cover for wildlife. In **Alternatives 2, 3, 4 and 5,** harvest units on south-facing slopes are designed to maintain elevational corridors while minimizing fragmentation. **Alternatives 1 and 6** have the least effect on south facing slopes (Alternative 1 harvests 11 acres).

- **Alternative 2 and 5-** Harvest 210 acres in the center of the south-facing slope. This divides the block into two parts, but leaves the south-facing areas closest to saltwater unharvested.
- **Alternative 3 and 4-** Harvest 112 acres in the center of the south facing slope. This divides the block into two parts, but leaves the south-facing areas closest to saltwater unharvested. These alternatives do not harvest any of the south-facing habitat in the King George watershed.

Elevational corridors on south facing slopes are maintained by unit design. Alternatives 2 and 5 harvest the most.

Estuaries- We discuss some of the effects to estuaries under the Freshwater system issue (Issue #3). Estuaries are important to resident and migrant waterfowl. The more productive estuaries are semi-enclosed by land. The King George planning area has two estuaries, one at the mouth of Honeymoon Creek and the other at the mouth of King George Creek. The King George estuary is larger and enclosed. All alternatives protect this estuary and wildlife values from direct impacts. **Alternatives 2 and 5** may have indirect effects from increased access since roads are located within 1/3 mile of the estuary. Road closures planned under these alternatives will help mitigate the potential indirect effects. The Honeymoon Creek estuary is also protected from direct impacts

All estuaries are protected. Alternatives 2 and 5 propose road construction within 1/3 mile of the King George estuary.

under all alternatives. Management activities are 1/2 mile from the mouth of Honeymoon Creek under **Alternatives 1, 2, 3, 4 and 5.** Indirect effects of action alternatives could include the temporary displacement of waterfowl due to the activity surrounding the log transfer site and rafts during the logging operations lasting 2-5 years.

Other Environmental Considerations

Irreversible and Irretrievable Commitments of Resources

Construction of roads and rock pits permanently commit resources.

Irreversible and irretrievable commitments of resources are resources that we would impact that will not be returned or could return, but only over long periods of time. For this analysis, the irreversible disturbance of some types of cultural resources could occur on unknown sites, subsurface sites, or even known sites when unplanned events occur.

Use of petroleum fuels and rock sources for road and sort yard construction commits non-renewable resources. Alternatives 1 and 6 have no effect on mineral resource use at this time.

Roading the study area will irreversibly reduce the potential amount of area that could be designated as part of the Wilderness Preservation System or managed for other purposes that require natural characteristics. Roads would also commit a certain amount of acres of forest and muskeg and would eventually be converted over time to seed beds for grasses and alder. Alternatives 1 and 6 would not have these consequences.

Under all alternatives, except Alternative 6, there will be an irretrievable loss of old growth forest unless rehabilitation occurs over a period of 250-300 years. Due to increased fragmentation, other old growth areas adjacent to units would have their habitat values reduced.

Unavoidable Environmental Effects

Unavoidable effects will occur to some extent on air quality, sedimentation, and wildlife habitats due to increased human activity during and after logging.

Although we designed mitigation measures, units, and roads to avoid adverse consequences, some impacts to the environment cannot be completely mitigated and would be expected to occur.

Air quality would diminish on a recurring, temporary basis due to the construction of roads (if applicable), timber harvest, and hauling. Limbs and logging slash will be burned at sortyards intermittently throughout the logging periods which will deposit minor amounts of particulate matter and smoke into the air.

Although Best Management Practices are designed to protect soil and water, some potential for surface erosion, sediment production, channel erosion, and mass movement does exist. Helicopter yarding reduces this risk considerably but road development does pose a risk of sediment production. In addition, sediment production could displace fish or result in a loss of habitat near stream crossings and temporarily affect the function of the freshwater system.

Increased human activity both during and after logging, and loss of habitat, would result in impacts to fish and wildlife species, particularly those populations which have low numbers or are more sensitive to the presence of people. The habitat for old growth

dependent species would also be reduced. Travel corridors between old growth blocks in adjacent watersheds would also be reduced in size and fragmented which may affect the ability for individuals to disperse and genetic material to exchange among local populations of species.

Although the degree of impact varies with the alternative selected, presence of logging operation would temporarily affect the use of the area by outfitter/guides, commercial fishermen, tourists, and local recreationists. There would also be some loss of primitive and semi-primitive recreation opportunities in the study area with the roaded alternatives. The natural landscape as viewed from surrounding waterways, islands, and interior alpine areas on Etolin could appear visually altered under some alternatives and may be noticeable to viewers.

Effects on air quality and sedimentation are relatively short term in nature (1-3 years) and only temporarily affect existing ecosystem functions. Others, such as the loss of old-growth habitat and impacts to wildlife populations from harvest resulting from increased human access, will be long term and could affect species diversity in the study area.

Alaska Coastal Management Program

We are consistent with the policies of the ACMP.

We have determined that the proposed alternatives, including the preferred alternative, are consistent with the Alaska Coastal Management Program to the maximum extent practicable. We have based this determination on the analysis and mitigation measures outlined in this document. In particular, we direct your attention to our methods of addressing Issues 3 and 4 (Freshwater System and Habitat Conservation), and the specific measures outlined and summarized in the Unit, Road, And Log Transfer Facility cards (Appendix B and D). We are requesting that the Office of Governmental Coordination (OGC) review our finding of consistency on Alternative 5 during the comment period.

ANILCA Section 810 Subsistence Evaluation Process

Section 810 of ANILCA requires a Federal agency, having jurisdiction over public lands in Alaska, to analyze the potential effects of proposed land-use activities on subsistence uses and needs. An ANILCA 810 analysis should include: an evaluation of the possibility of affects on subsistence uses; a distinct finding on whether the proposed action may significantly restrict subsistence uses; notices and hearings if the evaluation results in a finding that the proposed action may significantly restrict subsistence uses; and determinations if, following a public hearing a finding of a significant restriction remains, the responsible official decides to proceed with the proposed project.

Evaluation criteria used to assess the effects of the proposed alternatives are: (1) changes in abundance or distribution of subsistence resources, (2) supply and demand, (3) changes in access to subsistence resources, and (4) changes in competition from non-subsistence users for those resources. The evaluation determines whether subsistence uses within the analysis area or portions of the area may be significantly restricted by any of the proposed action alternatives. Wildlife, fish, shellfish, marine mammals, other foods, and timber are the resources used for subsistence that are evaluated in the subsistence report. A complete Subsistence Report has been done and is in the planning file.

King George Subsistence/ANILCA 810 Findings

The Findings are based on the evaluations in the Subsistence Report on abundance, distribution, supply and demand, access and competition for harvested resources in the

study area, WAA 1901 and the Etolin Island area. The area is not an extensively used subsistence harvest area. There would be some decreases in habitat capability for wildlife under the action alternatives. However, the habitat would be capable of maintaining populations greater than projected harvest demand under all alternatives through the rotation (Figures 3-26 through 3-29). The effects on finfish and shellfish populations are expected to be minimal and should not affect the supply available for subsistence harvest.

Figure 3-26, Estimated Supply and Demand for Black Bear in WAA 1901

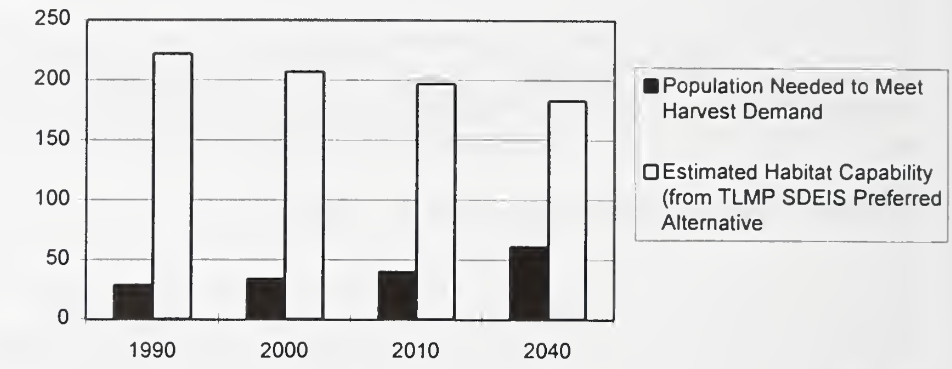


Figure 3-27, Estimated Supply and Demand for Deer in WAA 1901

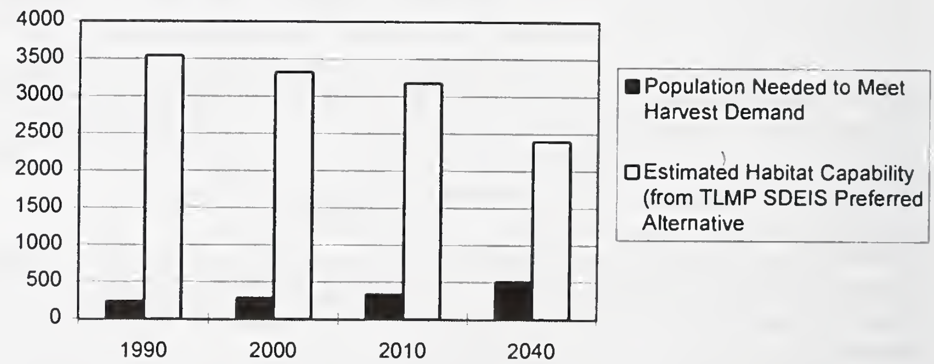


Figure 3-28, Estimated Supply and Demand for Marten in WAA 1901

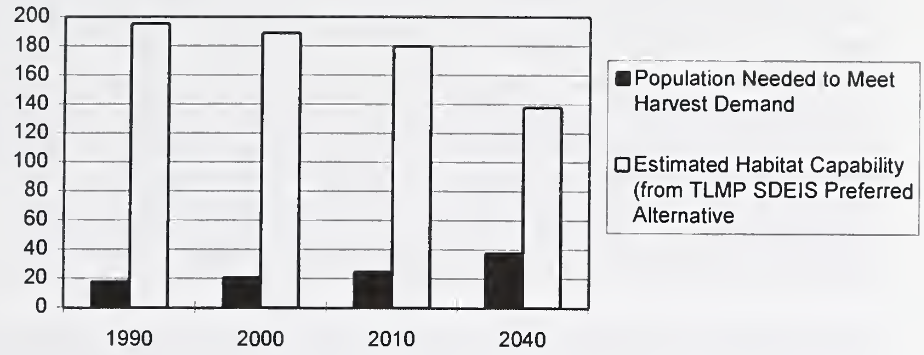
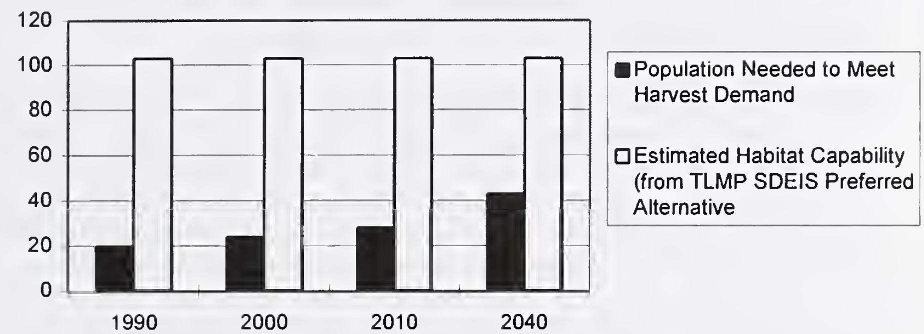


Figure 3-29, Estimated Supply and Demand for River Otter in WAA 1901



Although there may be some long term changes in access, we do not expect that the increased access would reduce subsistence harvests below historic levels, and the habitat capability should be sufficient to meet some, if not all, of the increased demand for deer. Alternative 5 would result in construction of the most roads, followed by alternatives 2, 3 and 4. No roads would be constructed under Alternative 1, which would therefore affect access the least. Closure of roads to motorized access under some alternatives will further mitigate effect of access. A substantial increase in competition for subsistence wildlife resources from non-rural community residents is not projected to result from the alternatives proposed.

There will not be a significant restriction on subsistence uses.

A finding that there will not be a significant restriction on subsistence uses is in order for wildlife, fish and shellfish, marine mammals, other foods, and timber resources.

Cultural Resources

The Cultural Resource Overview of the Tongass National Forest (Arndt, Sackett and Ketz 1987) and The Bitter Water People: A Cultural Resources Overview of Etolin Island, Southeast Alaska (Rabich-Campbell 1988) describe the diversity of cultural resource sites that are or have the potential of being discovered in southeast Alaska and Etolin Island. Both overviews present basic cultural and environmental contexts and themes within which we can evaluate specific site significance. They provide background information, identify gaps in the present understanding of the cultural use of southeast Alaska and serve as interpretive documents for sensitizing both the general public and Forest Service personnel to the significance and fragile nature of cultural resources. The reader is directed to those reports for a more detailed description of the cultural heritage of southeast Alaska and Etolin Island. The following description is a summary of information we gathered during an extensive literature and files search.

Cultural resources include the evidence of past human activity, potentially dating from the first occupation of southeast Alaska to the recent past. Information on the history of the region and Etolin Island is limited. Some sites in the region, including the Ground Hog Bay 2 site on the Chilkat Peninsula and the Hidden Falls site on Baranof Island, indicate the first occupation of southeast Alaska dates to nearly 10,000 years ago. The earliest cultural period in southeast Alaska, from about 8000 to 4500 B.C., is characterized by small groups of people focusing on a maritime subsistence pattern. These early people used distinctive small volcanic glass blades, known as obsidian microblades, and other tools chipped from stone. This early period is followed by one of transition, roughly between 4500 and 3000 B.C., when people changed their emphasis from chipped stone tools to ground and polished stone tools. Few sites have been dated to this transitional period and our understanding of associated lifestyles is limited.

By about 3000 B.C. it appears the environment stabilized and salmon and other natural resources became more dependable for subsistence purposes. The earliest dated site on Etolin Island, located south of the study area, was occupied between 580 B.C. and A.D. 450. By A.D. 500 a Northwest Coast culture emerged that was characterized by large winter villages, defensive sites, shell midden deposits and a preponderance of ground stone tools. This period lasted until European contact in the mid to late 1700s.

The Tlingit Indians are the most widespread and numerous indigenous group in southeast Alaska, but the point at which they first entered southeast Alaska is still speculative. The Tlingit Indians are composed of a number of kwans (loosely referred to as tribes) who's boundaries have continuously fluctuated. The study area falls within the former territory of the Stikine Tlingit, who some asserted were the most populous and powerful of all Tlingit kwans (Oberg 1973; Olson 1967). Smaller political divisions known as clans are present within each kwan. Each clan owned tangible property, such as salmon streams, berry patches, offshore waters for hunting sea mammals and catching bottom fish, and both winter and summer homes. In addition they held intangible property such as crests, house and personal names, songs and origin stories.

The mid to late 1700s marked the arrival of Russian, British, Spanish, French and American explorers, dispatched to investigate the Northwest Coast of North America. They came to lay claim to new lands for their countries, to appraise the vast natural resources and to look for a shorter trade route to China. Captain George Vancouver made the earliest European documentation of indigenous occupation on Etolin Island during his 1793 passage through Clarence Strait. Vancouver reported abandoned villages along

Etolin Island's western shore, although he did not report encounters with any indigenous residents.

Ethnographic accounts of Etolin Island recall a rich Tlingit heritage of traditional land use, but no mention is made of specific sites within the present study area. An 1880 Alaska census lists four Stikine Tlingit villages on Etolin Island. There is no indication, however, that any of the four villages were located in the present study area.

By the mid-nineteenth century many traditional Stikine Tlingit villages, including some on Etolin Island, had fallen into neglect (Olson 1967:57). The Russian's built Redoubt Dionysius on the north end of nearby Wrangell Island in 1834. Neighboring Stikine Tlingit groups who traded at the post began to move closer to Wrangell. The movement into Wrangell continued with the Hudson's Bay Company takeover in 1849 and intensified with the American establishment of Fort Wrangell in 1867 and later missionary activity (Krause 1956:73).

Historic activity in the study area appears to have been relatively limited. North Etolin Island's relatively steep and rocky coast was probably not as conducive to human settlement and use as other parts of the island and surrounding areas. Historic activities included logging, subsistence hunting and gathering and recreation. Forest Service records indicate selective hand logging began along the coast in the early twentieth century.

Previous Investigations

No sites eligible to the National Register of Historic Places will be affected.

Prior to this study, three cultural resource field surveys had been conducted on north Etolin Island. In addition, Emmons (1908:225) reported a petroglyph site (Alaska Heritage Resource Survey Site PET-018) on the northwest tip of Etolin Island during his travels in the 1880s. Stevens (1974:2) later failure to locate the petroglyphs lead Frederica de Laguna to speculate that Emmons had actually been referring to petroglyphs on the north end of adjacent Wrangell Island (Emmons 1991:80). Sealaska Corporation investigators conducted a cultural resource survey of southeast Alaska in 1975, including portions of the study area (Sealaska Corporation 1975). A Wrangell elder reported a permanent village site within the present study area, but investigators failed to locate such a site. They did record an old garden plot in the same area (Alaska Heritage Resource Survey Site PET-103) and speculated the surrounding area was used as a seasonal fish camp. This site was not selected by Sealaska Corporation as a historic or cemetery site under provisions of 14(h)(1) of the Alaska Native Claims Settlement Act. Forest Service archaeologist Larry Roberts conducted a limited survey of portions of the present study area in 1985 (Roberts 1985), but he did not report any new sites. A Forest Service contractor evaluated two potential log transfer facilities along a small section of Etolin Island's northeast coast in 1992. The archaeologists on the review team reported no cultural resources except for one possible bark-stripped cedar, numerous springboard-notched trees (evidence of historic hand-logging) and modern camping debris (Davis et al. 1992:23-29). Most of what is known about the archaeological heritage of Etolin Island comes from Forest Service surveys conducted around Anita Bay, Burnett Inlet and Mosman Inlet.

Environmental Consequences

No sites eligible to the National Register of Historic Places will be affected in any of the action alternatives. Cultural resources within southeast Alaska and the Tongass National Forest may reveal important information on past environmental conditions and human lifestyles, including information related to the first entry of people along the north Pacific

Rim. These resources are fragile and easily damaged. They are also non-renewable. Primary or direct impacts to cultural resource can include alteration to the settings of sites; alteration of above ground objects, features and structures and the spatial relationships among them; and disturbance or destruction of subsurface cultural deposits. Secondary or indirect impacts may include a higher frequency of site looting and vandalism due to increased human access to previously remote areas.

Federal laws and regulations require processes for considering the impacts of Federal projects on significant cultural resources. Major legislation related to these processes includes the National Historic Preservation Act, as amended; the Archaeological Resources Protection Act, as amended; the American Indian Religious Freedom Act; and the Native American Graves Protection and Repatriation Act. Section 106 of the National Historic Preservation Act (specified in the regulations of the Advisory Council on Historic Preservation at 36 CFR 800) outlines a process for evaluating the effects Federal projects may have on cultural resources. It involves inventorying cultural resources, determining which are significant or eligible to the National Register of Historic Places, evaluating project effects, and designing and implementing measures to negate any adverse effects that project may have upon significant resources. This process is undertaken in consultation with the Alaska State Historic Preservation Officer and sometimes with the Advisory Council on Historic Preservation, an independent Federal agency.

We recently signed a programmatic agreement with the Advisory Council on Historic Preservation and the Alaska State Historic Preservation Officer that implements a model for cultural resource site probability or sensitivity. The probability model reflects the results of about 89,000 acres of field survey conducted by archaeologists on the Tongass National Forest during the last 20 years. The model defines the high probability zone as all areas between mean low water and 100 feet in elevation. In addition, the high probability zone includes mineralized zones; river and lake systems that provide passage to or over larger land masses; streams and lakes with anadromous fish runs; fossil marine, river and lake terrace systems; karst landforms; areas associated with traditional cultural myths and legends; and raw material sources such as cedar stands and obsidian deposits. Everything not defined as high probability is considered in the low probability zone. Normally, we survey all areas of high probability and a portion of low probability areas.

Forest Service archaeologists surveyed a total of 2,940 acres during 1993 and 1994, or roughly 18 percent of the entire study area. The survey included about 620 acres of coastal fringe, 170 acres of tide flats and 2,150 acres in interior upland and alpine areas. The archaeologists walked parallel lines about 60 feet apart while conducting subsurface tests at least every 60 feet. Subsurface test frequency increased in areas where site potential appeared highest. We supplemented subsurface testing by examining exposed ground surfaces such as tree root wads, animal trails and stream cut banks. Site and survey information is on file at the Stikine Area Supervisor's Office in Petersburg, Alaska. This information is generally not available to the public because of site sensitivity to looting and vandalism. Site location information is specifically exempt from the Freedom of Information Act.

Eight new sites were found through field surveys.

We recorded eight new sites, including four shell middens, two wood stake fish traps, one possible stone fish trap and one historic campsite. We also revisited the reported locations of the two previously reported sites (Alaska Heritage Resource Survey Sites PET-018 and PET-103). We were unable to confirm the presence of the petroglyph site (PET-018) reported by Emmons. We did locate site PET-103, previously recorded by Sealaska Corporation. Of the eight new sites and the one previously recorded, six appear to meet the eligibility criteria for the National Register of Historic Places. These include Alaska Heritage Resource Survey sites PET-343, PET-346, PET-347, PET-389, PET-398

and PET-399. The remaining three sites (PET-103, PET-344 and PET-345) do not appear to meet the National Register eligibility criteria. Archaeologists also recorded 68 culturally modified trees scattered throughout the study area, but none of them appear to meet the National Register eligibility criteria.

The human settlement and use of north Etolin Island is represented by nine sites and scattered culturally modified trees. The archaeological record indicates north Etolin Island was occupied during both ancient and historic times. Radiocarbon dates obtained from study area sites reflect occupation ranging from about A.D. 230 to A.D. 1100. Natural resource harvest and processing appear as the primary activities represented by cultural remains. Exploited resources include cedar, hemlock and spruce; marine invertebrates; fish; and terrestrial mammals.

A report summarizing the 1993 and 1994 field surveys has been submitted to the Alaska State Historic Preservation Officer. Copies of this report were provided to the Wrangell Cooperative Association (local Native tribe). The report indicates that six of nine known sites are eligible to the National Register of Historic Places. The report concludes that none of the eligible sites will be affected by any of the proposed action alternatives. The report's summary conclusion is that there are no sites listed in or eligible for listing in the National Register of Historic Places (historic properties as defined in Section 106 of the National Historic Preservation Act) within the area of potential effect. The State Historic Preservation Officer decided not to comment on our report, thus completing the Section 106 consultation process.

None of the sites eligible to the National Register of Historic Places will be affected in any of the action alternatives. All the sites are within protective buffers. There is a possibility, however, that undiscovered sites are present within some of the areas slated for timber harvest or road construction. In general, those alternatives that propose higher levels of ground disturbance pose a greater potential threat to significant undiscovered cultural resources.

Cumulative Effects

Impacts from decay, neglect, natural landscape changes and development pose a threat to the preservation of significant study area cultural resources. Future timber harvest and other ground disturbing development could result in the loss of cultural resources. Site looting and vandalism could occur due to increased access to remote areas. Previous cultural resource surveys indicate most if not all of the cultural resources are located within a short distance of the present coastline. It is impossible, however, to determine the exact number and nature of cultural resources that are threatened by future development. Maintenance of beach fringe and estuary buffer zones for future development will effectively lessen the potential impact to cultural resources. Implementation of field surveys and various mitigation measures will reduce the potential loss by preserving significant sites and by providing data on those that can not be preserved. Periodic monitoring of roads and timber harvest areas may reveal if previously undiscovered sites have been exposed or damaged. Monitoring may also be utilized to determine if sites outside direct impact areas are being affected by increased pedestrian traffic.

Sensitive Plants

One sensitive plant was located by field surveys. Alternatives 2, 3, and 5 will affect individual plants, but no overall population viability.

A sensitive plant survey was conducted to assess the effect on sensitive plant species if an action alternative is implemented. The LTF site and other beach areas were surveyed by the Alaska Natural Heritage botanist. Roads and harvest units were surveyed by District personnel while doing reconnaissance work. A total of 18 days were spent surveying the project area. The biological evaluation is on file at the District office.

Choris bog orchid (Platanthera chorisiana, ldk), a sensitive plant species, was found in the project area in four locations in the upper King George valley. Individual plants will be destroyed if roads are constructed as laid out in Alternatives 2,3, and 5 in the upper King George valley. The destruction of individual plants is not likely to affect overall species population viability because of the number of occurrences that have been reported on the Wrangell Ranger District. Additionally, not all plants that were discovered will be directly impacted by construction of the road or timber harvest units. However, viability of the population in upper King George is of concern. The plants subjected to indirect impacts related to this project will be monitored, and actions will be taken to protect them (see Appendix C).

Timber and Soil Productivity

There are other natural processes taking place within King George study area that will have an affect on productivity and will need to be taken into account when management activities are implemented. Spacing and stand diversity work together to reduce insect population growth. Diverse landscapes, both vertical structure and plant species, will help prevent localized outbreaks from reaching epidemic levels. Insect populations decrease with increased distance to host trees which results in longer exposure to mortality agents and the elimination of energy reserves. There are two known outbreak locations of black-headed budworm in the King George study area. The budworm will be monitored to prevent further spread. If large numbers of trees start to die, actions may be taken to remove dead and weakened trees needed to prevent an epidemic.

Porcupines kill and cause wounds that introduce rot in western hemlock within the King George study area. Steps could be taken to increase the natural predators of porcupines, such as introduction of fishers, to reduce damage to the next rotation of western hemlock.

Yellow-cedar decline is not believed to be caused by biotic processes, for that reason the spread of the decline to healthy yellow-cedars is not believed to be a concern. Since yellow-cedar snags are very decay resistant they are not as valuable use for cavity nesting wildlife as other tree species. Yellow-cedar decline areas should be harvested for the wood quality that remains and replaced with a new health stand. Yellow-cedar decline areas will eventually regenerate, probably to western hemlock, but unless the snags are removed the trees growing among the snags will rub against them as the wind blows, this will cause rub scars on the hemlock which will be an entrance for insects and disease.

Building roads will permanently take some land out of production. If length and width of temporary spur roads are kept to a minimum, this will reduce the amount of land temporarily taken out of production. Clearing widths should be kept to a minimum along the mainline road paralleling King George and Honeymoon Creeks to reduce the likelihood of blowdown. Roads that are not maintained will return back into production but will be delayed 40-80 years because red alder usually dominates the site for this length of time before conifer re-establishment begins. Logging slash and cull logs left around landings in large quantities delay conifer establishment for a number of decades

because there is not any soil or organic matter available for seedling establishment. Heavily used yarding corridors that degrade soil productivity can delay conifer establishment for 40-80 years because red alder will usually establish first on these sites.

The 50% retention prescriptions will need to be carefully implemented to avoid reduction of timber productivity.

The harvest prescriptions try to achieve multiple objectives, such as, scenic quality, reduce fragmentation, maintain stand structure, and harvest timber. All the prescriptions are believed to produce productive timber stands for future harvests. However, careful implementation will be needed to carry out the 50% retention prescriptions because if all the high quality trees are removed this entry, the timber productivity may be reduced. Timber production decline can be expected if the dominant trees left are cull and suppress the establishment and growth of new healthy seedlings and saplings. This problem can be avoided by leaving a mix of healthy tree species. This prescription will produce a 2 or 3 storied stand depending on how it is harvested the next entry.

The units treated with a 70% retention will retain their present timber productivity. This prescription will remove timber in small patches and groups. These areas will regenerate to western hemlock, which is the predominate species harvested. If patch and group size are large enough and an adequate seed source is available, then some Sitka spruce, Alaska yellow-cedar and redcedar can be expected to regenerate as well. Leaving a few healthy spruce and cedar as seedtrees will help to regenerate a mix of tree species within the patches and groups. This prescription will produce a uneven-aged stand that will need to be entered on a 20-50 year cutting cycle to harvest other patches and groups and precommercially thin the patches and groups that are harvested this entry. Trees heavily infected with mistletoe should not be left on the boundary of harvest patches or groups so that the productivity of the regeneration within the groups and patches will not be adversely affected.

Units that have a harvest prescription of 30% retention will result in a two storied stand. The retention is expected to contain some healthy codominate and intermediate yellow-cedar, spruce and redcedar, some dominate hemlock and spruce that are cull for cavity nesting wildlife, groups of healthy advanced regeneration that will be less than 10" DBH and snags, as safety permits. A good mix of tree species is expected to regenerate within these units. The stand is expected to be productive and the growth of the trees is expected to be greater than the spread of mistletoe, if present.

Areas that have a 10% retention prescription will produce a productive timber stand. When a seed source is available it produces the most tree diversity. The 10% retention prescription will remove a majority of the merchantable trees within the harvest unit. This prescription is the most effective way to control mistletoe and other diseases.

The overstory removal with 10% retention prescription will be used to remove yellow-cedar from cedar decline areas. The 10% retention will be the advanced regeneration, which is predominately hemlock saplings. It is important to remove the dead cedar before the hemlock gets larger and rub wounds become a problem. This prescription will produce an even-aged stand.

Common to all prescriptions for maintaining a healthy timber stand and to continue to meet multiple resource objectives, it will be critical to implement outyear treatments such as thinning and sanitation harvests.

All alternatives protect long term soil and vegetation productivity.

All alternatives were designed to protect the long term productivity of the study area through avoidance, protection using BMP's and site-specific mitigation measures. Site productivity was a primary consideration in designing harvest units. All units are located on ground capable of sustaining productivity with intensive forest management, including

those areas identified as wetlands. A site specific erosion control plan will be developed for road construction, rock pit quarry development and the LTF.

Native species

Grass seeding is a standard practice for controlling soil erosion when the soil is exposed during construction. Typically, non-native species are used, resulting in the "introduction" of exotic species. In general, this has not been seen as a problem because the introduced grass species have not been found to invade and displace the native flora. To prevent the introduction of non-native flora into the King George timber sale area, native species will be used for erosion control and other revegetation purposes.

Wild and Scenic Rivers

The Tongass Land Management Plan Draft Revision of 1991 does not recognize any of the rivers within the study area as potentially eligible for designation as a Wild and Scenic River. We are aware that there is a citizens' proposal, backed by the Southeast Alaska Conservation Council (SEACC) and Tongass Rivers Coalition, to designate 5 miles of the King George River (in this document, we refer to it as King George 'Creek') as 'Wild' under the Wild and Scenic Rivers Act. Wild Rivers have a quarter mile protection buffer on each side of the river. Alternatives 2, 3, and 5 propose harvest units within a quarter mile of King George Creek. Alternatives 1, 4, and 6 do not propose harvest within a quarter mile of King George Creek.

Other Findings

The effects of the alternatives on consumers is reflected in the discussion of the various goods and services supplied as a result of the proposed alternatives (see Issue #2, this chapter). We have determined that the actions proposed in the alternatives will not adversely affect prime farm land, range land, rivers eligible for Wild and Scenic River designation, Class II Airshed standards associated with the Clean Air Act, or Wilderness, nor will it adversely impact civil rights, women, or minorities.

Chapter 4

List of Preparers

4 - List of Preparers

Dan Barnett, Engineering Technician
B.S. General Agriculture, South Dakota State University
Forest Service: 20 years
Engineering Technician, Stikine Area, Tongass N.F.
Engineering Technician, Chatham Area, Tongass N.F.

Jim Brainard, Wildlife Biologist
B.S. Forest Management, Washington State University
Forest Service: 11 years
Wildlife Biologist, Stikine Area, Tongass N.F.
Forester, Ketchikan Area, Tongass N.F.
Forestry Technician, Mendicino N.F.
Forestry Technician, Wenatchee N.F.
Research Technologist, Washington State University: 4 years

Deirdre Buschmann, Landscape Architect, Consultant
B.L.A. Landscape Architecture
Forest Service: 14 years
Landscape Architect, Stikine Area, Tongass N.F.

Jackie deMontigny, Soil Scientist
B.A. Education, University of Montana
M.S. Forest Ecology, University of Montana
Forest Service: 8 years
Soil Scientist, Stikine Area, Tongass N.F.
Ecologist Trainee, Bitteroot N.F.
Biological Technician, Nez Perce N.F.
Biological Technician, Stikine Area, Tongass N.F.

Dee Galla, Recreation Planner
B.S. Wildland Recreation Management, University of Idaho
Forest Service: 7 years
Recreation Planner, Stikine Area, Tongass N.F.
Recreation Forester, Nez Perce N.F.

Randy Hojem, Forester
B.S. Forestry, University of Wisconsin, Stevens Point
Forest Service: 15 years
Forester, Stikine Area, Tongass N.F.
Forestry Technician, Chatham Area, Tongass N.F.
Forestry Technician, White River N.F.

4 - List of Preparers

Jerry Jordan, Silviculturist
B.S. Forest Management, Northern Arizona University
Forest Service: 10 years
Silviculturist, Stikine Area, Tongass N.F.
Forester, Klamath N.F.
Forestry Technician, Klamath N.F.
Forestry Technician, San Juan N.F.

Deborah L. Kary, Wildlife Biologist
B.S. Wildlife and Rangeland Sciences, Oregon State University
M.S. Resource Management/Wildlife, University of Nevada-Reno
Forest Service: 8 years
Wildlife Biologist, Dixie N.F.
Wildlife Biologist, Stikine Area, Tongass N.F.
Wildlife Biologist, Freemont N.F.
Range Conservationist, Ochoco N.F.
Forestry Technician, Tahoe N.F.
State of California, Water Quality Analyst: 5 years

Mark McCallum, Archaeologist
B.A. Anthropology, James Madison University, Wisconsin
Forest Service: 8 years
Forest Archaeologist, Stikine Area, Tongass N.F.
Private Consultant: 10 years

Margaret Mitchell, Interdisciplinary Team Leader
B.S. Landscape Architecture, Colorado State University
M.S. Forest Management, University of Idaho
Forest Service: 9 years
Forester, Stikine Area, Tongass N.F.
Landscape Architect, Stikine Area, Tongass N.F.
Landscape Architect, Wenatchee N.F.

Scott Posner, Wildlife Biologist
B.S. Wildlife, University of Minnesota
M.S. Forest Ecology, University of Minnesota
Forest Service: 7 years
Wildlife Biologist, Stikine Area, Tongass N.F.
Wildlife Biologist, Bighorn N.F.
Private Consultant: 2 years

4 - List of Preparers

Dennis Reed, Fishery Biologist
B.S. Biology, Kerney State, Nebraska
B.S. Forestry, University of Montana
Forest Service: 25 years
Fishery Biologist, Stikine Area, Tongass N.F.
Forester, Stikine Area, Tongass N.F.
Forester, Clearwater N.F.
Forester, Lolo N.F.

Julianne Thompson, Hydrologist
B.S. Natural Resource Management, California Polytechnic State University
Forest Service: 6 years
Hydrologist, Stikine Area, Tongass N.F.
Hydrologist, Dixie N.F.

Susan Wise-Eagle, Geographic Information Systems
B.S. Zoology, San Diego State University
Forest Service: 16 years
Fishery and Wildlife Biologist, Stikine Area, Tongass National Forest
Fishery and Wildlife Biologist, Nez Perce N.F.
Fishery Biologist, Idaho Panhandle N.F.

Chapter 5

List of Document Recipients

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Fred Clark
Marlene Clarke
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Michael Curran
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Chapter 6

Glossary

Glossary

Acronyms Used in Text

ACMP	Alaska Coastal Management Program
ADF&G	Alaska Department of Fish and Game
AHMU	Aquatic Habitat Management Unit
ANSCA	Alaska Native Settlement Act of 1971
ANILCA	Alaska National Interest Lands Conservation Act of 1980
BMP	Best Management Practices
CFR	Code of Federal Regulations
CMP	Corrugated Metal Pipe
CMPA	Corrugated Metal Pipe Arch
CZMA	Coastal Zone Management Act of 1976
DEIS	Draft Environmental Impact Statement
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
EVC	Existing/Expected Visual Condition
FEIS	Final Environmental Impact Statement
FSH	Forest Service Handbook
FSM	Forest Service Manual
GIS	Geographic Information System
GMU	Game Management Unit
HSI	Habitat Suitability Index
IDT	Interdisciplinary Team
KV	Knutsen-Vandenburg Act
LTF	Log Transfer Facility
LUD	Land Use Designation
LWD	Large Woody Debris
MBF	One Thousand Board Feet
MIS	Management Indicator Species
MMBF	Million Board Feet
NEPA	National Environmental Policy Act of 1969
NFMA	National Forest Management Act
ROD	Record of Decision
ROS	Recreation Opportunity Spectrum
RVD	Recreation Visitor Day
SEIS	Supplemental Environmental Impact Statement
SHPO	State Historic Preservation Officer
TIMCLU	Timber - Common Land Unit, GIS Layer
TLMP	Tongass Land Management Plan
TM	Thematic Mapping
TRUCS	Tongass Resource Use Cooperative Survey
TTRA	Tongass Timber Reform Act
USDA	United States Department of Agriculture
VCU	Value Comparison Unit
VQO	Visual Quality Objective
WAA	Wildlife Analysis Area

Terms Used in Text

Alaska National Interest Lands Conservation Act (ANILCA)
Passed by Congress in 1980, this legislation designated 14 National Forest Wilderness areas in Southeast Alaska. In section 705(a), Congress directed that at least $40,000,000 be made available annually to the Tongass Timber Supply Fund to maintain the timber supply from the Tongass National Forest at a rate of 4.5 billion board feet per decade. Section 810 requires evaluation of subsistence impacts before changing the use of these lands.

Alaska Native Claims Settlement Act (ANSCA)
ANSCA, which became law on December 18, 1971, provides for the settlement of certain land claims of Alaska natives and for other purposes.

Alpine/Subalpine Habitat
The region found on mountain peaks above conifer stands.

Beach Fringe Habitat
Habitat that occurs from the intertidal zone inland 500 feet, and islands of less than 50 acres. This habitat is especially important to marine and upland species.

Benthic Habitat
Refers to the substrate and organisms on the bottom of marine environments.

Best Management Practices (BMP)
Land management methods, measures, or practices intended to minimize or reduce water pollution. Usually BMPs are applied as a system of practices rather than a single practice. BMPs are selected on the basis of site-specific conditions that reflect natural background conditions and political, social, economic, and technical feasibility.

Biodiversity
Variety of life and its processes.

Bole
The trunk or main stem of a tree.

Buffer
Tongass Timber Reform Act requires that timber harvest be prohibited in an area no less than 100 feet of uncut timber in width from each side of all Class I streams and Class II streams which flow directly into Class I streams. This 100 foot area is referred to as a buffer.

Clearcut Regeneration Method
The objective of this regeneration method is to provide site conditions favorable for the establishment, growth, and management of desired species. Cool growing conditions, wet soils, strong winds, shallow rooted trees, abundant natural regeneration, and economic factors in southeast Alaska make this regeneration method the most desirable on most areas for stand establishment and management.

Commercial Fishery
Fish, shellfish, or other fishery resources taken or processed within a designated area for commercial purposes.

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Commercial Forest Land
Productive forest land that is producing, or capable of producing, crops of industrial wood and is not withdrawn from timber utilization by statute or administrative regulation. This includes areas suitable for management and generally capable of producing in excess of 20 cubic feet per acre of annual growth, or in excess of 8,000 board feet net volume per acre. It includes accessible and inaccessible areas.

Standard CFL: Timber that can be economically harvested with locally available logging systems such as highlead or short span skyline.

Nonstandard CFL: Timber that cannot be harvested with locally available logging systems and would require the use of other logging systems such as helicopter or longspan skyline.

Cruise
Refers to the general activity of determining timber volume and quality.

Cultural Resources
Historic or prehistoric objects, sites, buildings, structures, and so on, that result from past human activities.

Cumulative Effects
Cumulative effects are the impacts on the environment resulting from the addition of the incremental impacts of past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such action. Cumulative impacts can result from individually minor but collectively significant actions occurring over time.

Deer Winter Range
A combination of environmental elements that support Sitka black-tailed deer under moderately severe or severe winter conditions. Usually associated with high volume old-growth stands at low elevation and south aspects.

Draft Environmental Impact Statement (DEIS)
A statement of environmental effects for a major Federal action released to the public and other agencies from comment and review prior to a final management decision. (Required by Section 102 of the National Environmental Policy Act.)

Estuarine Fringe Habitat
This habitat type is located within a 1,000 foot zone around an estuary. It is especially important for shorebirds, waterfowl, bald eagles, and other marine associated species.

Estuary
For the purpose of this EIS, estuary refers to the relative flat, intertidal, and upland areas generally found at the heads of bays and mouths of streams. They are predominately mud and grass flats and are unforested except for scattered spruce or cottonwood.

Even-Aged Stand Management
A stand management strategy usually results in trees of one or two age classes within the stand. There are usually one or two entries which create site conditions favorable for seedling establishment. The three even-aged regeneration methods are seed tree, shelterwood, and clearcut. Stand regulation is simply managed by using one rotation age for a stand. The associated management costs are greatly reduced because of fewer harvest entries and stand treatments. Biological diversity is generally measured within the larger landscape or forest rather than within the even-aged stand.

Fish Habitat
The aquatic environment and the immediately surrounding terrestrial environment that, combined, afford the necessary physical, biological support systems required by fish species during the various life stages.

Fish Habitat Capability
The carrying capacity or the maximum number of fish the habitat can produce. Habitat capability is measured in smolts for anadromous fish and in numbers of adult fish for resident species.

Floodplain
The lowland and relatively flat areas joining inland and coastal waters, including debris cones and flood-prone areas of offshore islands; including, at a minimum, that area subject to a 1 percent (100 year recurrence) or greater chance of flooding in any given year.

Forested Habitat
All areas with forest cover. Used in this EIS to represent a general habitat zone.

Group Selection Regeneration Method
Small groups of trees are removed to create new groups of uniform, balanced age classes within the stand. The openings are usually regenerated from seed of the surrounding trees. Age class regulation within groups is usually accomplished by removing unwanted trees when adjacent groups are harvested.

Habitat Capability
The number of healthy animals that a habitat can sustain.

Highlead Cable Logging
A method of transporting logs to a collecting point (landing) by using a power cable passing through a block fastened off the ground to lift the front ends of the logs clear off the ground while in transit.

Habitat Suitability Index
This is a value assigned to a unit of land using a computerized model that relates vegetative and geographic characteristic (e.g. stand volume, proximity to a stream or cliff, slope, aspect, etc.) to the land unit's value for a particular wildlife species. Values range from 0 to 1, with 1 being the best. The Habitat Capability Models used to generate HSIs were developed by interagency teams of biologists using the best available information including research results and best professional judgment.

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Important Subsistence Use Area
Important Subsistence Use Areas include the "most-reliable" and "most often hunted" categories from the TRUCS survey and from subsistence survey data from ADF&G, the University of Alaska, and the Forest Service, Region 10. Important use areas include both intensive and extensive use areas for subsistence harvest of deer, furbearers, and salmon.

Individual Tree Selection Regeneration Method
Single trees are removed throughout the stand, and new trees are established soon after each harvest occurs. Regeneration is normally from seed of the surrounding trees. Age class distribution of a stand is regulated by frequent harvesting which removes trees from all age classes during each entry.

Interdisciplinary Team
Two or more natural resource planners who use relevant information to develop alternative design and comparison for a proposed project. The team insures that integrated use of environmental, social, and economic information is clearly presented so the best decision can be made.

Intermediate Stand Treatments
A stand management treatment which manipulates stand growth, composition, structure, or tree quality. Intermediate treatments include thinning, pruning, clearing, weeding, liberation, release, improvement, salvage, and sanitation cutting to achieve different management objectives. These stand treatments do not attempt to obtain new tree regeneration, and they occur before the final regeneration harvest. Some treatments such as salvage cutting or commercial thinning result in the harvest of forest products.

Land Use Designation
The method of classifying land uses presented in the Tongass Land Management Plan (TLMP). Land uses and activities are grouped to define, along with a set of coordinating policies, a compatible combination of management activities. The following is a description of the four classifications:

LUD I: Wilderness areas.

LUD II: These lands are to be managed in a roadless state in order to retain their wildland character, but this designation would permit wildlife and fish habitat improvements, as well as primitive recreation facilities, and road development under special authorization.

LUD III: These lands may be managed for a variety of uses. The emphasis is on managing for uses and activities in a compatible and complimentary manner to provide the greatest combination of benefits.

LUD IV: These lands provide opportunities for intensive resource use and development, where the emphasis is primarily on commodity or market resources.

Large Woody Debris (LWD)
Any piece of relatively stable woody material having a small-end diameter of at least 10 centimeters (4 inches) and a length greater than one meter (3 feet) that intrudes into the stream channel.

Log Transfer Facility
A facility that is used for transferring commercially harvested logs to and from a vessel or log raft. It is wholly or partially constructed in waters of the United States and location and construction are regulated by the 1987 Amendments to the Clean Water Act. Formerly termed "terminal transfer facility."

Logging Camp
A temporary facility established to house industry and Forest Service personnel while timber harvest occurs in the area.

Mass Failure
The downslope movement of a block or mass of soil. This usually occurs under conditions of high soil moisture, and does not include individual soil particles displaced as surface erosion.

Mitigation
Includes avoiding an impact altogether by not taking a certain action or part of an action; minimizing an impact by limiting the degree or magnitude of an action and its implementation; rectifying the impact by repairing, rehabilitating, or restoring the affected environment; reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action; or compensating for the impact by replacing or providing substitute resources or environments.

Multiple Entry
More than one stand or land treatment activity during a rotation of a stand or area.

National Environmental Policy Act of 1969
An act declaring a National policy to encourage productive harmony between humans and their environment, to promote efforts which will prevent or eliminate damage to the environment and the biosphere and stimulate the health and welfare of humans, to enrich the understanding of the ecological systems and natural resources important to the Nation and to establish a Council on Environmental Quality.

National Forest Management Act
A law passed in 1976 that amends the Forest and Rangeland Renewable Resources Planning Act and requires the preparation of Forest Plans.

"No Action" Alternative
The most likely condition expected to exist in the future if current management direction would continue unchanged.

Old-Growth
Ecosystems distinguished by old trees and related structural attributes.

Old-Growth Habitat
Wildlife habitat managed to maintain old-growth forest characteristics through the planning period.

Overstory Removal
Removing the overstory or dominant trees from the forest while leaving smaller understory trees.

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Precommercial Thinning
An intermediate stand treatment in even-aged stands which removes immature or undesirable trees to reduce competition so remaining trees can more fully utilize site potential and remain in a healthy condition.

Proportionality
The Tongass Timber Reform Act of 1990 states: "eliminate the practice of harvesting a disproportionate amount of old-growth timber by limiting the volume harvested over the rotation in volume classes 6 and 7, as defined in TLMP and supporting documents, so that the proportion of volume harvested in these classes within a contiguous management area does not exceed the proportion of volume currently represented by these classes within the management area."

Recreation Opportunity Spectrum (ROS)
A system for planning and managing recreation resources that categorized recreation opportunities into the following seven classes:

Primitive 1: A natural environment of fairly large size. Interaction between users is minimal. The area is managed to be essentially free from evidence of human-induced restrictions and controls.

Primitive 2: A natural environment of fairly large size adjacent to saltwater. Interaction between users is very low, and evidence of other users is minimal. The area is managed to be essentially free from evidence of human-induced restrictions and controls. Motorized use may occur at infrequent levels.

Semi-Primitive Non-Motorized: A natural or natural-appearing environment of moderate to large size. Concentration of users is low, but there is often evidence of other users. The area is managed to minimize on-site controls and restrictions. Use of local roads for recreational purposes is not allowed.

Semi-Primitive Motorized: A natural or natural-appearing environment of moderate to large size. Concentration of users is low, but there is often evidence of other users. The area is managed to minimize on-site controls and restrictions. Local roads used for other resource management activities may be present.

Roaded Natural: A natural-appearing environment with moderate evidence of the sights and sounds of man. Such evidence usually harmonizes with the natural environment. Interaction between users may be moderate to high with evidence of other users prevalent. Motorized use is allowed.

Roaded Modified: A natural environment that has been substantially modified particularly by vegetative manipulation. There is strong evidence of roads and/or highways. Frequency of contact is low to moderate

Rural: A natural environment that has been substantially modified by development of structures and vegetative manipulation. Structures are readily apparent and may range from scattered to small dominant clusters. Sights and sounds of humans are readily evident, and the interaction between users is often moderate to high.

Recreation Places
Identified geographical areas having one or more physical characteristics that are particularly attractive to people engaged in recreation activities. For example, they may be beaches, streamside or roadside areas, trail corridors, hunting areas of the immediate area surrounding a lake, cabin sites, or campgrounds.

Redd
Nest made in gravel, consisting of a depression hydraulically dug by a fish for egg deposition and then refilled with gravel.

Retention Factor
The amount of commercial forest land removed from the timber base to protect other resource values. These factors are allowances available to draw upon when meeting other resource needs and are not fixed policies to be rigidly applied by the IDT or Forest Supervisors.

Rotation
The planned number of years (approximately 100 years in Alaska) between the time that a forest stand is regenerated and its final cutting at a specified stage of maturity.

Salvage Cutting
Cutting primarily to utilize dead/down material resulting from windthrow and scattered poor risk trees that will not be marketable if left in the stand until the next scheduled harvest. Salvage sales must contain more than 50 percent by volume of dead, insect infested, or windthrown timber.

Sawlog
A log considered suitable in size and quality for producing sawn timber.

Section C Timber Sale Contract
Written contract requirements and conditions that purchaser must adhere to during a timber sale.

Seed Tree Regeneration Method
The objective of this regeneration method is to only leave trees which will provide seed to establish the new stand. Seed trees usually have good form, produce seed, are of the desired species, and are spaced to ensure adequate seed distribution. After the new seedlings are established, the seed trees are harvested, unless they are prescribed to be left as retention.

Silviculture
The branch of forestry involving the theory and practice of manipulating the establishment, composition, structure, and growth of forest vegetation. Silviculture involves the appropriate application of ecological, social, and economic principles of vegetative management to achieve resource management objectives and desired future forest conditions.

Silvicultural Prescription
A written technical document which provides detailed implementation direction about methods, techniques, timing, and monitoring of vegetative treatments. A prescription is prepared after a preferred treatment alternative has been selected, but before the project is implemented. A prescription is prepared by a silviculturalist who uses interdisciplinary input to best achieve established objectives, direction, and requirements for land managed by the USDA Forest Service.

Slash
Debris left over after a logging operation; i.e. limbs, bark, broken pieces of logs.

Soil Hazard Index
A relative index assigned to each soil map unit within which various soil hazards may be encountered. Hazards include mass failures and high sediment production during road construction.

Spawning Area
The available area in a stream course which is suitable for the deposition and incubation of salmon or trout eggs.

Species Diversity
The number of different species occurring in a location or under a similar environmental condition.

Stream Classification System
A means to categorize stream channels based on their fish production values. There are four stream classes on the Tongass National Forest. They are:

Class I: Streams with anadromous (fish ascending from oceans to breed in freshwater) or adfluvial (fish ascending from freshwater lakes to breed in streams) lake and stream fish habitat. Also included is the habitat upstream from migration barriers known to be reasonable enhancement opportunities for anadromous fish and habitat with high value resident sport fish populations.

Class II: Streams with resident fish populations and generally steep (often 6-15 percent) gradient (can also include streams from 0-6 percent gradient where no anadromous fish occur). These populations have limited sport fisheries values. These streams generally occur upstream of migration barriers or are steep gradient streams with other habitat features that preclude anadromous fish use.

Class III: Perennial and intermittent streams with no fish populations, but which have sufficient flow or transport sufficient sediment and debris to have potential water quality influence on downstream water quality or fish habitat capability. These streams generally have bankfull widths greater than 5 feet and are highly incised into the surrounding hillslope.

Class IV: Other intermittent, ephemeral, and small perennial channels with insufficient flow or sediment transport capabilities to have an immediate influence on downstream water quality or fish habitat capability. These streams generally are shallowly incised into the surrounding hillslope.

Non-streams are rills and other watercourses, generally intermittent and less than 1 foot in bankfull width, little or no incisement into the surrounding hillslope, and with little or no evidence of scour.

Subsistence
The term “subsistence uses” means the customary and traditional uses by rural Alaska residents of wild renewable resources for direct, personal, or family consumption as food, shelter, fuel, clothing, tools, or transportation; for the making and selling of handicraft articles out of non-edible byproducts of fish and wildlife resources taken for personal or family consumption; and for customary trade.

Succession
Changes over time in plant and animal populations or communities. Young, developing populations or communities usually change over time into perpetuating populations if environmental conditions do not change.

Suitability
An evaluation based upon a resource's potential use within proposed management activities.

Thematic Mapping
A vegetation map beased on satellite imagery.

Thousand Board Foot Measure
A method of timber measurement in which the unit is equivalent to 1,000 square feet of lumber one inch thick. It can be abbreviated Mbd, Mbm, or MBF.

TIMCLU
A map of forest management attributes based on soil units.

Tongass Land Management Plan (TLMP)
The land allocation plan for the Tongass National Forest which serves to direct and coordinate further planning on the Forest as well as the uses carried on within the Forest on a day-to-day basis. TLMP provides management direction for a period of ten years.

Tongass Resource Use Cooperative Study (TRUCS)
A compilation of subsistence data for evaluating the effects of the Forest Service's action contemplated in the revision of the regional Tongass Land Management Plan.

Uneven-aged Stand Management
A forest stand management strategy which results in trees of at least 3 three age classes. Relatively frequent harvest entries remove mature and immature trees either singly (individual tree selection) or in groups (group selection). Natural regeneration usually occurs soon after each harvest entry. Intermediate stand treatments are usually performed when the harvest entry occurs. Stand regulation or management is accomplished by manipulating stand density, stand structure, species composition, re-entry periods, and maximum tree age. These manipulation variables significantly increase the complexity of intensive forest management for uneven-aged stands. Biological diversity is generally greater within an uneven-aged stand than within an even-aged stand.

V-Notch
A relatively narrow, steep, V-shaped stream channel generally on steep, mountainous terrain.

Value Comparison Unit (VCU)
A distinct geographic area that generally encompasses a drainage basin containing one or more large stream systems. Boundaries usually follow easily recognizable watershed divides. These units were established on the Tongass National Forest to provide a common set of areas for which resource inventories could be conducted and resource value interpretations made.

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Visual Quality Objective (VQO)
A desired level of scenic quality and diversity of natural features based on physical and sociological characteristics of an area. Refers to the degree of acceptable alterations of the characteristic landscape.

Inventory VQO: Derived through application of the USDA Visual Management System. Uses three elements to determine the inventory: Sensitivity levels, distance zones, and landscape variety class. Provides a benchmark and illustrates the optimum objective based on current use patterns and sensitivity.

Adopted VQO: The VQO to be achieved as a result of management direction identified in the approved forest plan. Adopted VQOs represent the visual resource objective for the Forest Land Management Plan period, normally 10 years (FSH 2309.22, R10 Landscape Management Handbook).

Preservation: Management activities are generally not allowed in this setting. The landscape is allowed to evolve naturally.

Retention: Management activities are not evident to the casual forest visitor.

Partial Retention: Management activities may be evident, but are subordinate to the characteristic landscape.

Modification: Management activities may dominate the characteristic landscape but will, at the same time, use naturally established form, line, color, and texture. It should appear as a natural occurrence when viewed as middleground (1/4 to 5 miles from viewer).

Maximum Modification: Management activities may dominate the characteristic landscape, but should appear as a natural occurrence when viewed as background.

Volume
Stand volume based on standing net board feet per acre by Scribner Rule.

Volume Class
Average timber stand volume, given as thousand board feet per acre. The volume classes used in this EIS are 8-20, 20-30, 30-50, and 50+ MBF/acre.

Weighted Mean Patch Size
A measure of the average size of blocks of forest used in areas with non-normal distribution of patch sizes. Calculated as the sum of all (patch size/total forest area) multiplied by patch size.

Wetland
Those areas that are inundated by surface or ground water frequently enough to support vegetation or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction.

Wildlife Habitat
The locality where the species may be found and where all essentials for its development and existence are present.

Wildlife Habitat Management Unit (WHMU)
An area of wildlife habitat identified during the IDT process as having wildlife values of such importance that the habitat within the management area designated by the IDT is managed with wildlife as the primary resource value.

Windsnap
Occurs when wind is used as the mechanism that breakes the bole of the tree, usually at a weak point caused by bole rot or some other process that weakened the wood fibers within the tree. The root wad is still anchored into the ground.

Windthrow (Blowdown)
Trees which the wind blows over and the root wad is still attached to the tree bole. Windthrown trees usually displace soil because the tree roots have been ripped out of the ground.

Chapter 7

Literature Cited

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Chapter 8

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Appendix A

Summary of Landscape Analysis and Desired Future Condition

Appendix A

Summary of Landscape Analysis and Desired Future Condition

Summary of Etolin Landscape Analysis

The King George interdisciplinary team began by examining the importance of the King George study area within the landscape. Our primary interest was to determine how harvest in the study area might affect key wildlife corridors and large contiguous blocks of old growth. We also took into account the possibility of future harvest of other areas on Etolin Island. The following are our key findings:

- The Kunk Lake and Steamer Bay Value Comparison Units make the best potential medium size old growth blocks because they have valuable habitat and best compliment the location of the South Etolin Wilderness which functions as the large old growth conservation area on the island. These areas also have high dispersed and developed recreation values.

- Several smaller old growth blocks or conservation areas would be most effective in allowing dispersal between the medium and large blocks. Two of these are located in the King George study area (King George Estuary and Red Mountain Face). We made the recommendation to defer harvest in these two areas because a suitable small old growth block was not available near Anita Bay. The landscape is naturally fragmented near Anita Bay and past harvest (Starfish Timber Sale) has further fragmented old growth.

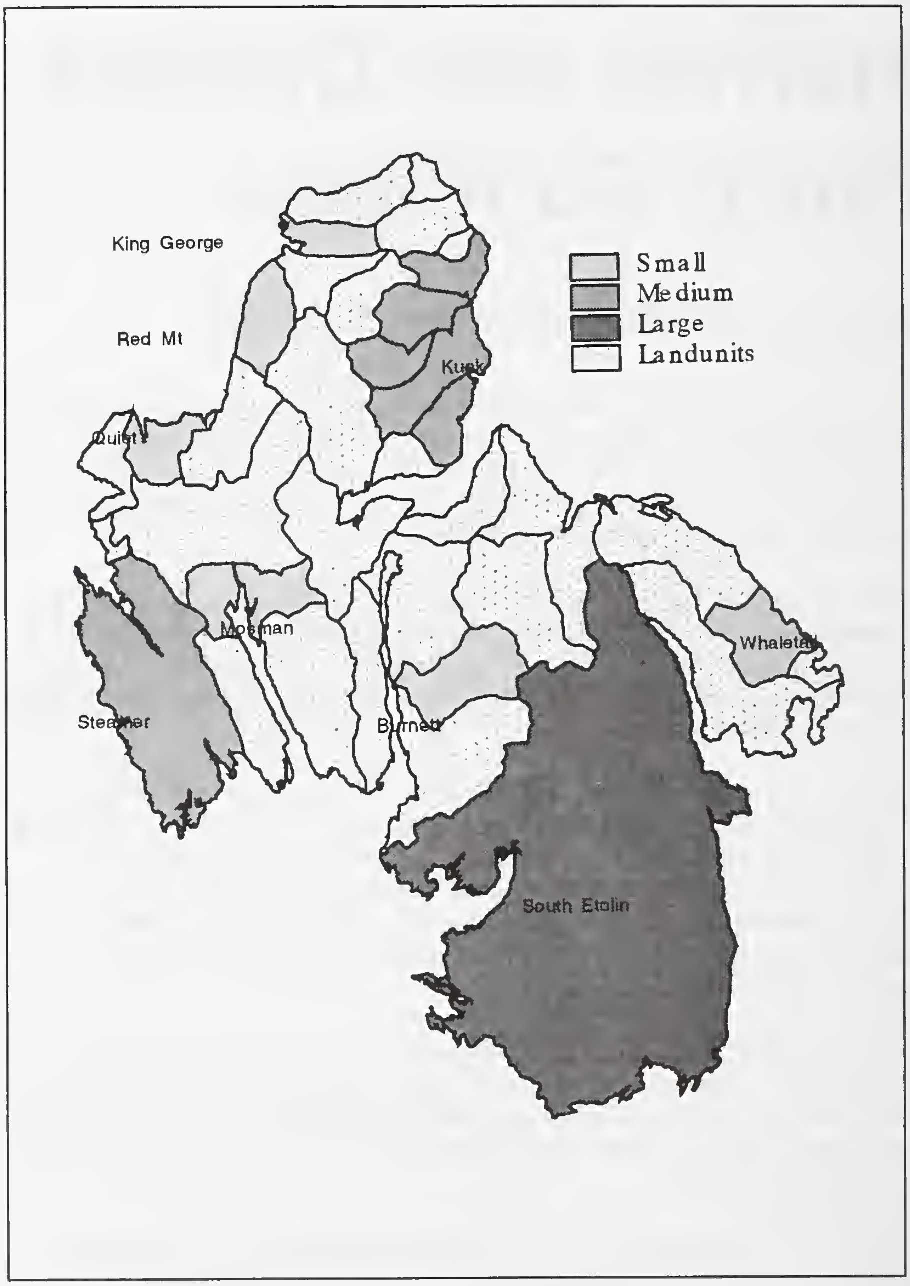
- The Red Mountain area makes a good old growth conservation block because it likely provides a dispersal corridor in the landscape. The forest habitat to the east of Red Mountain is fragmented by high elevation and open habitats. Red Mountain is in a key location to provide possible dispersal for species on the north half of the island to move to the south half.

- The lower King George creek area is the best old growth conservation block within the King George study area because it includes an estuary, has the greatest potential

to remain unroaded, has high wildlife values and contains the largest anadromous fishery. Locating a conservation block at King George also benefits cultural resource protection and recreation values.

- This network of large, medium and small old growth conservation areas would be effective when combined with TTRA buffers, beach buffers and inaccessible areas and other exclusions, in providing for an old growth network on the island over time. The cumulative effects of harvest are reduced by ensuring larger blocks of old growth are reserved across the landscape. Further impacts of harvest could be reduced by harvest methods that leave trees (wildlife legacies) within harvest units to varying degrees. Critical areas which have been harvested in the past should be managed to mimic stand re-initiation and/or old growth conditions over time.

Figure A-1: Potential Old Growth Conservation Areas



Potential Cumulative Effects on Etolin Island Vegetation

There were originally 119,540 acres of old growth on Etolin Island. Of this, 114,960 acres were interconnected by old growth stringers. Many of these stringers are too narrow to be used by interior old growth species, but would be used by other species such as deer, marten and red squirrels. There are currently 114,190 acres of old growth remaining on Etolin Island but only 104,380 acres are still interconnected. The rest of this block has been harvested or isolated by clearcuts. For species requiring interior old growth conditions, there were originally 9 blocks of interior old growth that were at least 1000 acres in size. Over the next ten years, further harvest is anticipated on Etolin Island that totals 80 MMBF. Possible cumulative effects of proposed harvest over the next ten years on Etolin Island are displayed in Table A-1 and Figures A-2, A-3 and A-4.

Table A-1: Possible Cumulative Effects of Harvest Over the Next Ten Years

Block Number	Original Acres	Existing Acres in Blocks >1000 Acres	Potential Acres of Harvest Over the Next 10 Years	Possible Effect on Block Size Assuming 'Worst Case'
1-King George	6,072	5,887	1,300 (Alt 5)	3,287 in 3 blocks
2-Kunk	5,756	4,654	0	4,654 (no change)
3-Steamer	14,490	11,015	780	9,455 in 1 block
4-SE Anita	1,251	0	0	0 (no change)
5-Mosman/Burnett	8,032	1,552 & 4,190	1,200	3,000 in 1 block
6-Menefee	2,718	2,395	130	2,135 in 1 block
7-S. Etolin	21,316	19,579	1,500	16,579 in 2 blocks
8-Three Way Pass	1,751	1,744	0	1,744 (no change)
9-SW Cove	3,298	2,195	390	0

Note- This analysis was conducted by assuming an average number of acres would be harvested in order to attain the volume scheduled with sales on the Stikine Area 10 year action plan. Since these future sales have not been planned, we had to make some assumptions about their location and effects. We assumed a "worst case scenario" where all acres harvested would be located entirely within the old growth blocks that are greater than 1000 acres in size (it is likely that future harvest could take place within old growth blocks <1000 acres, thus reducing effects on the larger blocks). We also assumed that the effects of this harvest would fragment twice the area as actually harvested. For example, if harvest units are spread out in a watershed it is possible for 50 acres of harvest to fragment 100 acres of an old growth block (once future harvest units are designed actual impacts will likely be less).

Figure A-2: Original Large Interior Old Growth Blocks

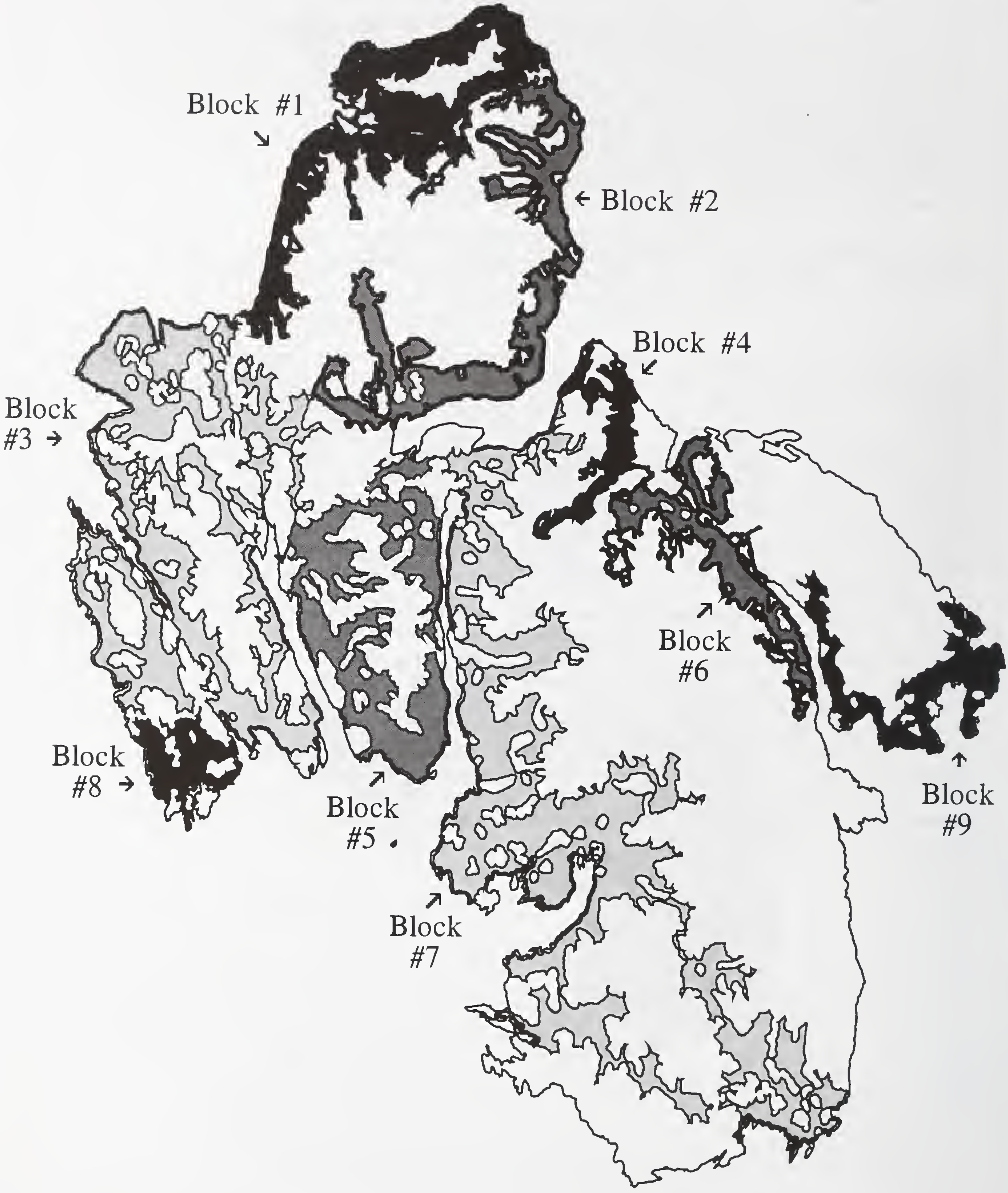
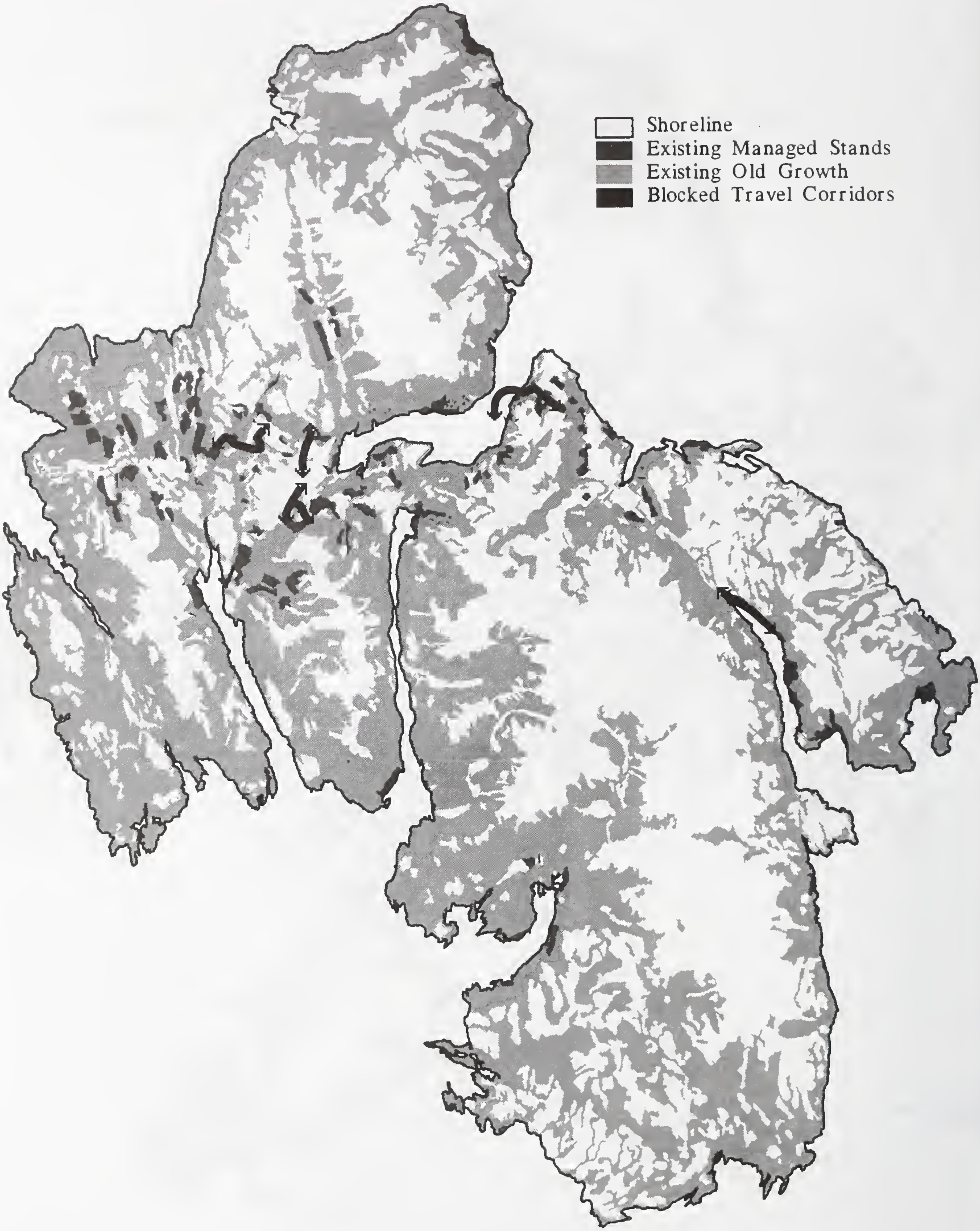


Figure A-3: Existing Old Growth Blocks and 10 Year Action Plan

Figure A-4: Existing Old Growth Plus Travel and Dispersal Corridors Blocked by Past Timber Harvest



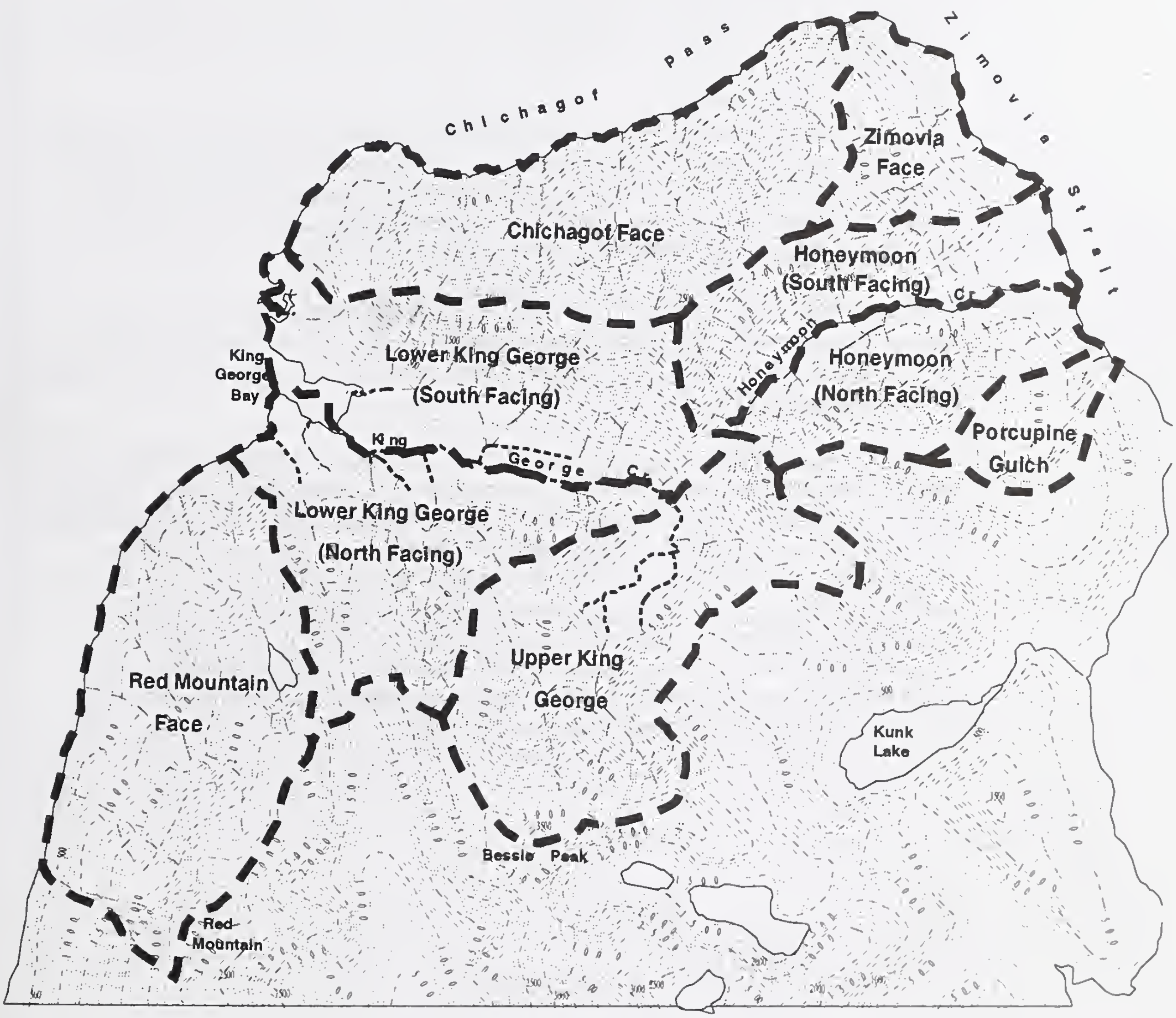
Desired Conditions in the King George Study Area

After determining some key actions we could take in the study area to minimize our effects on habitat conservation issues across the landscape, we focused on determining the potential desired condition of the King George study area. Because the proposed timber sale is the first major harvest in the area, it is important to 'think ahead' so planning incorporates key environmental values while economically harvesting timber. From this study, we were able to refine the purpose and need for the proposed sale.

The process we followed is briefly described below:

We divided the study area up into smaller watersheds that had similar environmental issues (see Figure A-5 for land units). Each land unit was described in terms of its ecology, social and economic conditions.

Figure A-5: Land Units in the King George Study Area



A - Landscape Analysis and DFC

We identified macro and micro disturbance factors naturally occurring in the study area in order to possibly 'mimic' them with our harvest practices. Disturbance factors include: porcupines, windthrow, cedar die-back and decline, beaver activity, landslides, avalanches and flooding. Blowdown occurs more frequently around the 'corners' of the study area near Chichagof pass. Most other blowdown is relatively small in scale. Landslides are a more prevalent disturbance feature and resulted in many of the forest characteristics we see today. We found that:

- The vegetative patterns of landslides and patchy blowdown could be copied,
- Management practices would have to be conscious of flooding events especially when designing roads,
- Porcupines would play a role in stand regeneration by chewing on young hemlock and,
- The cedar die-back and decline areas could be harvested with few environmental effects.

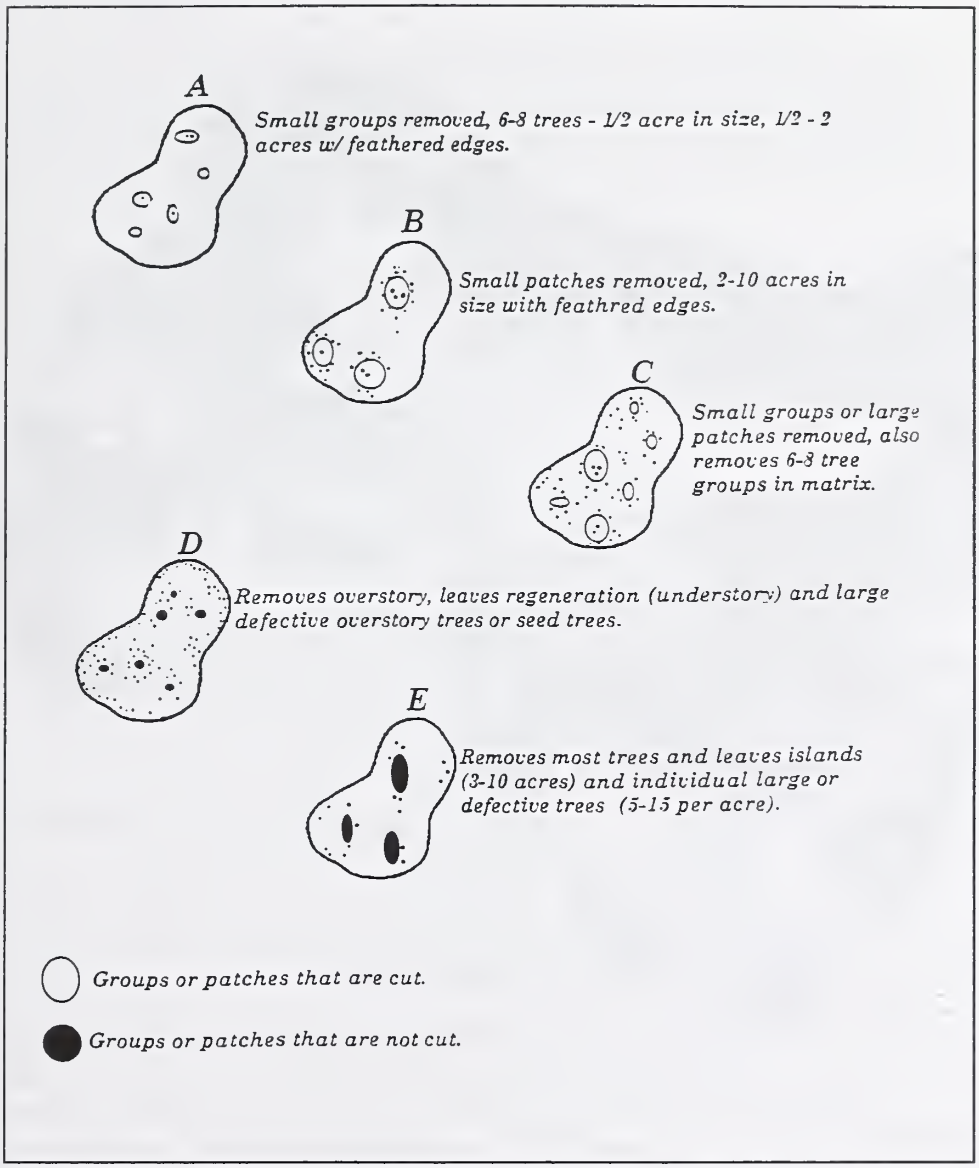
We identified key wildlife dispersal areas, unique areas and critical habitat. Key wildlife dispersal areas or corridors included; the Kunk Lake saddle, Fishtrap Creek, elevational corridors on the south-facing slopes and riparian corridors. Unique areas or critical habitats included the estuaries, riparian areas, south facing slopes, a high volume stand on the north side of Honeymoon Creek and the beaver ponds at the head of King George Creek.

We located the boundaries of the two old growth conservation blocks in the Red Mountain and King George areas. We did this by using current forest plan standards to calculate the amount of acres needed in the study area to meet habitat conservation needs. We then located the majority of this "retention" in the two areas recommended from the landscape analysis. Stream, estuary and beach buffers were also added.

We determined the location of the remaining commercial forest land and divided it up into areas that could be roaded, logged with skyline systems or would have to be logged with helicopter. This helped us determine what was technically 'possible' to achieve with current logging systems.

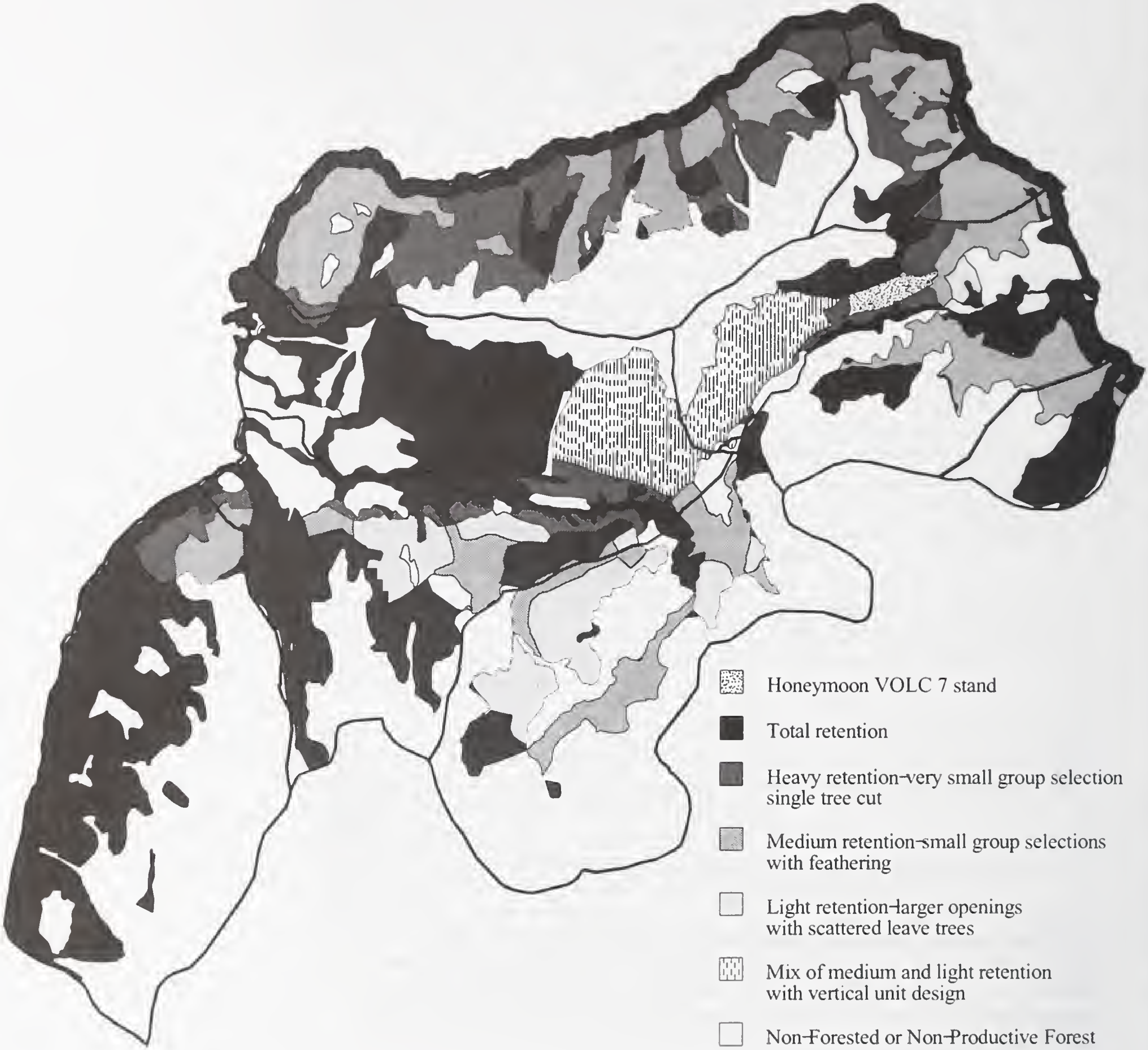
With the above as a base, we then examined the kind of landscape pattern we wanted to establish by harvesting areas and leaving varying amounts of trees (heavy, medium and light tree retention). Heavier tree retention is designed along riparian corridors, the area between the Red Mountain and King George estuary and steeper slopes that are more visible. Light tree retention is designed for areas that had fairly high productivity and few resource concerns. Moderate tree retention is designed for areas that had potential wildlife dispersal areas and moderately steep, visible slopes. We developed general prescriptions or harvest methods to help meet the structural retention goals for the land units (see Figure A-6). We also identified some areas to add to the old growth retention network, under the guidelines of the current Forest Plan.

Figure A-6: General Harvest Prescriptions



The last step identified the rate of harvest that was desirable within each land unit. This resulted in harvest acreage thresholds every 35-50 years. The results of the desired condition analysis are summarized by land unit, starting on page A-11. The conditions described were incorporated into the purpose and need for the King George Timber Sale and each alternative.

Figure A-7: Desired Future Condition



Porcupine Gulch Land Unit

Existing Condition:

This area is named for the predominance of porcupine activity which keeps most of the vegetative productivity cycling in small trees or highly defective large trees. In addition, most of this land unit contains unstable slopes. A stream passes through the middle of this land unit and contributes to the shallow marine bench near Honeymoon Creek. This area can be seen from Zimovia Strait.

There are approximately 73 acres of available land for harvest, but of this only 1/3 or 24 acres are considered manageable at this time. This is due to the predominance of low volume stands, heavy defect from porcupine activity, and the need to manage this area with helicopters. Approximately 210 acres would be retained on steep slopes and in the beach fringe, and an additional 48 acres will be retained because it is unmanageable at this time.

Desired Future Conditions:

- Maintain landscape character and meet Partial Retention VQO.

- The desired vegetative condition would maintain the status quo. Of the manageable lands, 24 acres would be available for harvest within the first 50 years. Harvest methods would include B and C, thereby retaining a moderate amount of residual structure within the managed stands (see Figures A-6 and A-7).

Zimovia Face Land Unit

Existing Condition:

This land unit faces toward Wrangell Island's Zimovia Highway. It contains a high percentage of higher volume class stands which makes it valuable commercially and as habitat for ungulates. One small anadromous stream was found within this land unit. An existing harvest unit is approximately 160 acres in size and approximately 35 years old. Natural disturbance factors include small patches of blowdown, cedar decline and minor porcupine activity. A high percentage of cedar occurs within this land unit, some of which is dying. In addition, a concentration of culturally modified trees occurs near the beach.

Within this unit approximately 504 acres are both available and capable of being managed through timber harvest at this time. This includes approximately half of the existing 160 acre clear-cut which is outside the beach fringe. In this land unit, 216 acres will be retained in an old growth condition.

Desired Future Condition:

- ♦ The desired vegetative condition is to maintain at least 50% of the existing forested habitat in an old growth or mature (100+ years old) condition, with heavy to medium residual structure, for ungulate habitat and to serve some of the needs of species dependent upon snags and variable vegetative structure. Future thinning of harvested beach fringe could restore these values more readily.

- The desired visual condition will meet the Partial Retention VQO from Zimovia Strait and Zimovia highway. It is estimated that no more than 80-100 acres can be treated at one time prior to visual recovery, which is estimated to take 35-40 years in this land unit. The current harvest unit is not visually recovered. Heavy to medium residual structure (see Figures A-6 and A-7) is planned to be left within managed stands. This accounts for the high number of acres estimated to be treated in a single entry because harvest can be "feathered" into the landscape. This condition could be better achieved, and a larger number of acres treated at one time (approx. 100 acres), if a helicopter is used for yarding. If cable systems are used, a lower number of acres (approx. 70-80 acres) can be treated each entry, because the units would appear more noticeable.

- The above conditions would result in treating approximately 1/5 or 80- 100 acres of the manageable land every 35 years. For modeling purposes, the rotation is assumed to be 175 years.

Chichagof Land Unit

Existing Condition:

This land unit is characterized by north-facing, steep slopes. The predominant natural disturbance factors in this area are small patches of blowdown (up to 1 acre in size) and some porcupine damage, particularly in western hemlock. Stand composition varies widely in species distribution, structure and commercial value. The entire land unit is visible from the ferry route and partially visible from the Zimovia travel routes.

Presently, there are approximately 1377 acres available for timber harvest within this land unit. However, an estimated 25% is not capable of supporting harvest operations due to pockets of steep rocky terrain and areas incapable of supporting helicopter yarding. Therefore, 1033 acres are considered manageable and 939 acres will be retained (595 high hazard/beach fringe retention acres plus 344 unmanageable acres).

Desired Condition:

- The desired vegetative condition is to maintain a diverse structure and species composition, thereby, mimicking the existing condition, through time. Gradually, a younger forest will result on 1/2 the land unit over approximately 200 years. Increases in commercial productivity of trees is expected by managing for medium to medium/large diameter classes. A mix of young and older, large diameter trees will be retained in managed areas. However, the species composition should remain at existing proportions.

- Largely contiguous, unfragmented landscapes composed of predominantly multi-storied stands is desired through time. While managed stands may not be "old-growth," they will provide thermal cover, forage and some of the structural components of old growth. An optimum harvest strategy would treat a mix of medium and heavy residual structure areas each entry (see Figures A-6 and A-7).

- A variety of harvest prescriptions will be used to achieve a multi-storied stand and the appearance of a large-scale texture change or "feathered" look across the entire landscape. The same acre of land may be entered more than once, to achieve the desired condition. Large treatment areas which appear feathered (>100 acres), are

preferred over smaller "blocks" or more visible forms in the landscape. Harvest prescriptions A-D, will be utilized in combination to achieve the desired result.

- These areas will be managed to produce scenery, wildlife habitat and sawlogs. Western hemlock is the predominant species, but spruce and cedar are also present. Pockets of cedar appear throughout this land unit and should be retained through time. Harvest prescriptions should maintain some degree of natural stocking control. Due to potential porcupine activity, precommercial thinning is not expected to be required. If thinning does become necessary, it could be timed to occur with harvest.

- To achieve the Partial Retention VQO, no more than 15% of the viewshed will appear modified at a time. Complete visual recovery of treated areas is assumed take 35-40 years. The "rotation" of any treated area is assumed to be 200 years for modeling purposes.

- Approximately 1033 acres are expected to be harvested over the next 200 years. This will leave approximately 939 acres in an original "old growth" condition along the beach, small streams, and in extremely steep, or unstable slope areas, which can not be feasibly harvested. Since the rotation is assumed to be 200 years, and no more than 15% of the land unit is to be treated at any one time, we estimate that 200-300 acres can be treated every 40 years. This assumes re-entry into the same acre in some areas. Such treatments should be distributed across the face in both heavy and medium residual structure areas (see Figures A-6 and A-7).

- Logging systems used for harvest will be aerial, allowing greater control, and more flexibility to achieve a multi-storied stand structure.

- The ability of this area to provide bear denning areas (rocky outcrops, cliffs and large standing or downed trees that have or create cavities) will be maintained by an unroaded condition, and by leaving large trees or a buffer around known or suspected bear denning areas. Eagle nests will be protected by the beach buffer and timing of activities.

Red Mountain Land Unit

Existing Condition:

This land unit is similar to the Chichagof Land Unit in its topography and vegetative condition, except that it is predominantly west facing. The entire land unit is visible from the ferry route. No anadromous streams are present within this land unit. This land unit could be maintained as a travel corridor between old growth blocks within the North Etolin landscape. Its position in the landscape makes it potentially important as a Habitat Conservation Area or as an area for "retention" under current direction. Natural disturbance factors include small patches of blowdown, porcupine damage and landslides.

Under a management strategy that retains this area as a potential HCA, 1183 acres will be retained. Approximately, 176 acres are considered available for harvest but 25% is incapable of supporting helicopter yarding or contains pockets of cliffs and rocky terrain. Thus, 132 acres are considered manageable.

Desired Future Condition:

- The desired future vegetative condition is to retain the majority of this area in its original old growth condition. This area would also meet the requirements for a small Habitat Conservation Area, as outlined in the Viable Population Report.

- The existing visual character will be Partially Retained with heavy to medium residual structure left in managed areas.

- The 132 acres of manageable area will be treated as a contiguous area, with harvest prescriptions varying from A-D (see Figures A-6 and A-7).

- A primary objective within the 132 acre manageable area is to maintain the corridor next to the beach fringe between the King George old growth block and the Red Mountain old growth block. This would also maintain the visual quality of this area from the ferry route and achieve the Partial Retention VQO.

Upper King George Land Unit

Existing Condition:

This land unit encompasses the upper reaches of King George Creek, and is very different from the characteristics of the lower King George land unit. Stringers of timber follow King George Creek which meanders through large muskegs. A series of beaver ponds lend to the freshwater system diversity as well as productivity. This stream productivity is available to resident cutthroat and anadromous Dolly Varden char. Side slopes have moderate to high vegetative productivity. Most of the land unit is not visible from saltwater, but is highly visible from the alpine trail corridor to Bessie Peak. Natural disturbance factors are mostly small blowdown patches and porcupine damage.

There are approximately 158 acres of forested lands retained on steep slopes or located within TTRA buffers. There are approximately 696 acres of available and manageable land for timber harvest.

Desired Future Condition:

- Vegetation will be managed in large blocks of mostly single-storied stands. Islands, feathering and shaping of these large harvest areas will achieve a VQO of Modification as seen from the potential alpine trail corridor and other recreational use that may occur with the introduction of roads in the VCU. Some structural diversity will be maintained within stands by leaving islands and individual trees of various size-classes. Harvest prescriptions are mainly D and E (see Figures A-6 and A-7).

- Fragmentation over the first entries will be minimized by harvesting areas at the head of the drainage first.

- Fifty percent (50%) of this land unit will be maintained in a mature or old growth condition over time for ungulate habitat. To achieve this there are two options; 1) 464 acres may be harvested within the first 50 years leaving 232 acres of the available land unharvested for 100 years, or 2) approximately 232 acres could be harvested every 50 years on a 150 year rotation.

- Roads built within this land unit may be closed after timber harvest. Closures appear to be justified because of the periodic entry, reduced maintenance costs and to meet habitat and water quality objectives.

- The productivity of Upper King George Creek and the beaver ponds will be maintained by road management objectives/placement, TTRA buffers and leaving heavy residual structure in managed stands within the riparian corridor. Productivity of the upper King George freshwater system can be enhanced by introducing salmon and steelhead by blasting the barrier at the northern end of the land unit.

Lower King George Land Unit

Existing Condition:

The Lower King George land unit is highly productive for fish, wildlife, marine life, and vegetation. Historically, the estuary has attracted people because of the subsistence, scenery, recreation and timber resource values. Natural disturbance factors include landslides, flooding, small blowdown and porcupine activity. The estuary, riparian corridors, and south- facing slopes (<500' elev.), are the most productive areas within this land unit for fish and wildlife. Dispersal/travel corridors for wildlife within this unit are primarily located along riparian zones or sideslopes (elevational corridors for ungulates are especially important on south facing slopes). This land unit is divided by King George Creek into north and south facing areas. South facing stands have a higher habitat value for most wildlife species. King George Creek is a cold stream due to topographic and vegetative shading. There is a partial barrier to anadromous fish on the upstream boundary of this land unit.

Overall 2016 acres are retained in their original old growth condition (1952 acres retention plus 64 acres considered unmanageable). Available lands constitute 940 acres, 876 acres of which is estimated to be manageable for timber using a variety of harvest methods.

Desired Condition:

- For habitat conservation and biodiversity, a large "old growth" block will be retained in this land unit on the south facing slope near the King George Estuary. This area is over 1600 acres in size with approximately 900 acres in volume class 4 and above stands. This unit should be managed in an unroaded condition over time.

- At least sixty percent (60%) of this land unit will be retained in an old growth or mature habitat condition over time. Approximately 876 acres is considered available for harvest, with 365 acres in the north-facing side and 511 acres in the south-facing side, and could be harvested with a mix of harvest prescriptions. Of these 876 acres, 186 acres within the King George Creek riparian corridor will be managed to achieve old growth (300 year rotation).

- <u>Upland South Facing</u>: The remainder of the upland, south facing area will be a mix of single and multi-storied stands. There are approximately 400 acres of upland, south facing slopes available and manageable for harvest. For modeling purposes, it is assumed that 1/4 of these acres will be harvested every 50 years. Managed stands will reach the age of 200 before being considered for harvest again. Openings will be managed by "feathering" them into existing stands. Islands and shaping of managed

stands will be used to increase both visual and structural diversity. Managed stands will be long and thin (with aerial logging on top, and cable logging further down slope) to maintain elevational travel corridors and mimic natural slide patterns. This area should be managed to minimize the fragmentation of the adjacent block of old growth, and roads used for harvest within this area may be closed after harvest or minimized to reduce access to interior habitat.

- Upland North Facing: Will be managed for sawlogs, wildlife habitat, scenery and recreation. The existing trail corridor to the alpine and Bessie Peàk may eventually be developed. The existing trail corridor will be buffered and the existing vegetative condition will be maintained. Views of the land unit from the trail corridor will meet the visual quality objective of Modification to Partial Retention. Approximately 321 acres, of the available and manageable lands will be managed as a mix of single storied and multi-storied stands. For modeling purposes, 1/4 (25%) of the available forest land is assumed to be harvested every 50 years, in order to provide visual diversity, allow for visual recovery and keep forage values relatively stable over time. An alternative approach is to harvest 1/2 (50%) of the available land every 100 years, allowing for extended recovery time between entries Managed stands will reach the age of 200 years before being considered for harvest.

- The road management strategy will be to keep the road on the south side of King George Creek open for small sale activity, but minimize habitat fragmentation and road construction by working toward the west.

- Water based recreation values near the estuary will be retained as semi-primitive, since this area overlaps with the large, retention area. Foreground scenery will be retained and middle ground scenery will be partially retained from this popular recreation place.

- The floodplain of King George creek will be buffered by 100 feet (TTRA buffers). Between this buffer and the road, stands will be managed with smaller, dispersed patches of harvest with heavy residual structure (see Figures A-6 and A-7) with an extended rotation of 300 years (approximately 35 acres, treated every 50 years). This area will be managed for a high percentage of spruce, and high value sawlog or specialty products. Pruning, planting and thinning are all activities which may occur in these stands. King George Creek may benefit by an increase in overall stream productivity due to the increase in diffused light near the stream channel.

Honeymoon Land Unit

Existing Condition:

The existing vegetative and natural disturbance factors are similar to the King George land units. This land unit is also predominantly north-south facing, but Honeymoon Creek does not have as much anadromous stream and does not have as significant an estuary. There is a distinctive stand ("Honeymoon Stand") of volume class 6 and 7 timber, predominantly composed of spruce, with some cedar on the south slope. It is distinctive for its volume, composition and its rare juxtaposition (upland slope) in the landscape. The north facing side of the land unit is predominated by high hazard soils. The Honeymoon valley faces toward Zimovia Highway on Wrangell Island and there are oblique views of the land unit from residences along this highway.

Overall, there are approximately 564 acres which will be retained in an old growth condition and approximately 808 acres (includes the 65 acre Honeymoon Stand) which is both available and manageable for harvest. Most of the land capable of supporting timber harvest is on the south-facing side of Honeymoon Creek.

Desired Future Condition:

- This land unit contains the best site for a log transfer facility (see Appendix D for log transfer facility information). A mainline road system could be located on either side of Honeymoon Creek. A location on the south-facing side would favor timber access and economics while a location on the north-facing side may favor wildlife use of the south-facing habitat, water quality and possibly lower road maintenance costs over time.

- This area has the only other potential large block of contiguous, "old growth," which could meet the small HCA requirements outlined in the Viable Population Report. However, given that this land unit contains the best area in the VCU for a log transfer site, this would mean that a road would likely bisect the block in order to harvest interior areas. This large block is also not as valuable as the King George block from a habitat conservation standpoint, because it has less anadromous stream and less estuary.

- Sixty percent (60%) of this land unit will be retained in an old growth or mature condition over time (100+ years). Approximately 808 acres is considered available and manageable for harvest.

- Harvest activities should seek to minimize the fragmentation of the Volume class 6/7 stand (Honeymoon Stand) on the south-facing side over the first few entries. The portion of the stand that is volume class 7 could be unique enough to justify retaining a portion of it. Approximately 104 acres of riparian habitat would be managed under a 300 year rotation (17 acres harvested every 50 years). Combined with retention areas, there will be a small block of old growth retained near the mouth of Honeymoon Creek.

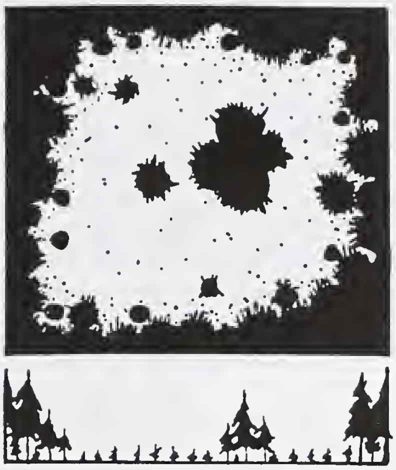
- Upland North Facing: There are 191 acres of manageable land out of only 254 acres of available lands for timber harvest. Thus 358 total acres of north-facing habitat will be retained. Manageable lands can be harvested at any time by methods that leave medium residual structure since the manageable acres are visible from the Wrangell Island and Zimovia travelways.

- Upland South Facing: There are approximately 513 acres of south-facing upland outside the riparian corridor, that will be a mix of single and multi-storied stands. For modeling purposes it is assumed that 1/3 of these acres (169 acres), will be harvested every fifty years, under a 150 year rotation. Openings will be "feathered" into existing stands. Harvest units will be long and thin (with aerial logging on top and further down slope cable logging), to maintain elevational travel corridors and mimic natural slide patterns. This pattern will also help achieve the desired VQO of Partial Retention. Approximately 206 acres will be retained in their original old growth condition.

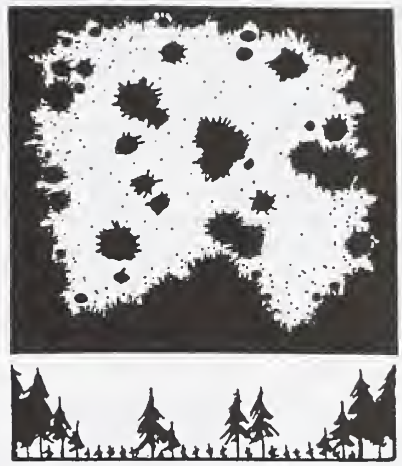
Appendix B

Unit and Road Cards, and Extra Alternative Maps

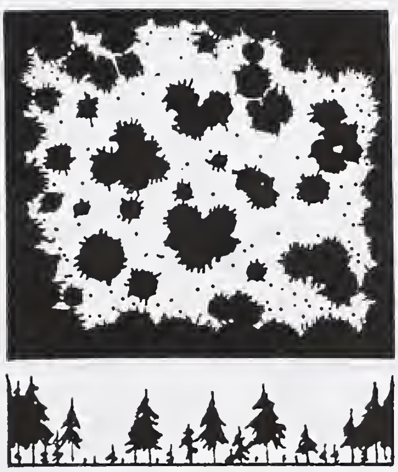
Overview and Sideview of Various Harvest Methods



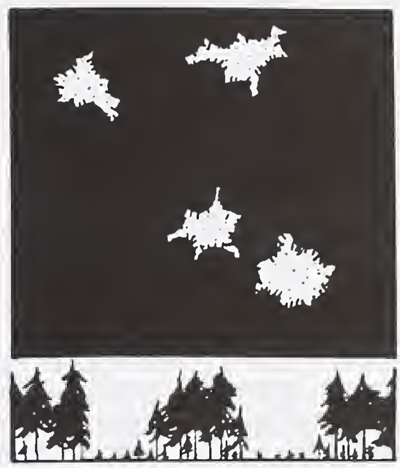
Clearcut w/ retention



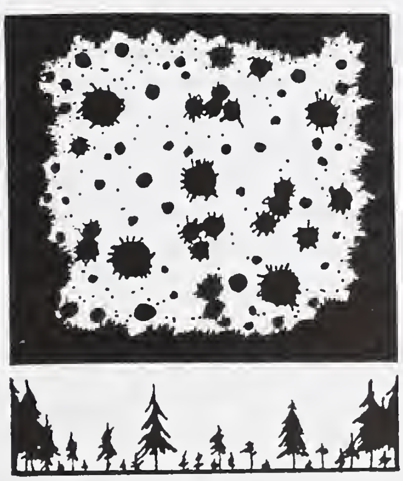
Individual tree w/ 30% retention



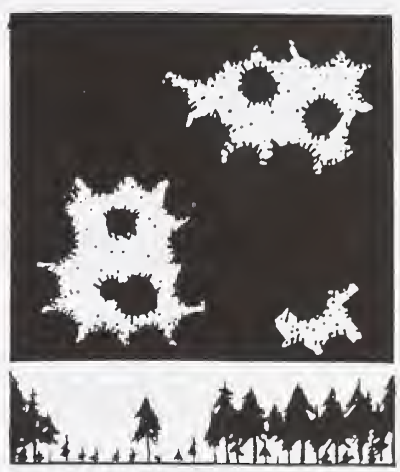
Individual tree w/ 50% retention



Group selection w/ 70% retention



Overstory removal w/ 10% retention



Patch cut w/ retention

King George Timber Sale Unit Number 1 In Alternative 1, 2, 3, 4, 5

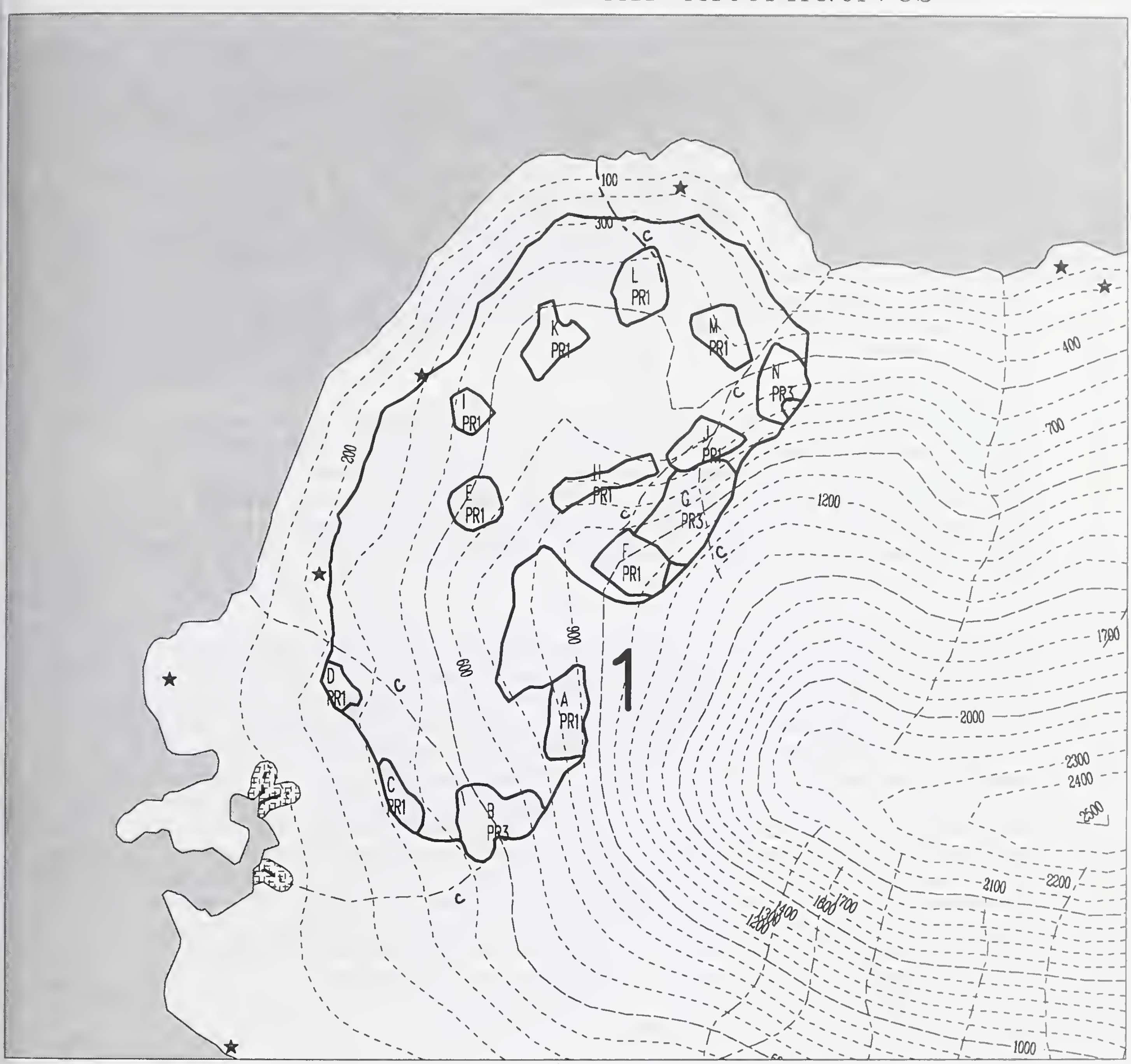
Compartment 156 VCU 462 Total Acres 306 Harvest Acres 69
Harvest method helicopter Volume Harvested 1535 MBF

EXISTING CONDITION:
This unit is located in the Chichagof land unit. This area is visible from Stikine Strait and the Alaska Marine Highway route; the area is visible from local small boat lanes and sport fishing areas, as well as the King George estuary. To people in the estuary, the area is at the toe slope of a mountain and appears to have rolling terrain with several steeper slopes. Blowdown in patches up to 1/2 acre are dispersed in the area particularly the northern part of the stand. Porcupine activity is fairly high in the hemlock. There are five class III streams within this unit, and 20 acres of high hazard soil. About half of the unit contains high quality deer winter habitat in the southern part of the unit and lower elevations.

DESIRED CONDITION:
Harvest and regenerate small areas within the larger unit over a period of 150 years, 4-5 times. Harvest will maintain a moderate to high amount of tree retention. This will reduce the level of fragmentation of the Chichagof and lower King George forest block, maintain ungulate winter range while creating small dispersed patches of usable forage. Maintain ability of the stand to provide dispersal for wildlife within the large forest block and the King George estuary area. Harvest will mimic natural vegetative patterns created by wind. Maintain stilted root trees of any species, snags, trees with large branches (greater than 3") for nesting platforms and large diameter trees with heart rot for cavity nesting birds. Maintain slope stability and water quality. Recreation and ferry/cruise ship passengers may notice harvest, but it should appear small, like natural disturbance dispersed over the landscape.

PRESCRIPTION DIRECTION:
This stand will be managed utilizing uneven-aged management. Harvest patches of timber between 2-8 acres in size. Sections A, C, D, E, F, H, I, J, K, L, & M will be harvested by patch cut while retaining at least 10% of the basal area. Sections B, G, & N will be harvested by patch cut while retaining at least 30% of the basal area. Sections B, G and N will retain more basal area because they are larger, more visible and contain healthy medium/small sized trees. Harvest patches should generally run parallel with the contours in the landscape in random groups and the edges of the patches should coincide with natural changes in the stand. This will mimic natural vegetative patterns as well as "feather" the harvest areas into the adjacent stand. Retention in the patches should be of three types: 1. Intermediate sized trees that are healthy and which will release. 2. Seed trees of yellow-cedar, redcedar and spruce; 3. Large, old, stilted rooted and heart rot trees effective as future snags; nesting & perching wildlife trees. The boundary of the patches should be as windfirm as possible, particularly adjacent to streams in sections J, G, M and N. Some windthrow may occur but should not expand existing harvest area over 10%. All streams will be protected by stream course protection clause 'c'. Inventoried high hazard soil areas in sections F, G, J, & N are moderately sloped areas adjacent to unstable hillslopes above the unit boundary. Risk of slope failure in the harvest areas is low. Opening up the canopy will make residual trees more susceptible to windthrow, which could cause slope failure. Harvested patches are at least 1000' from the estuary and at least 330' from 3 eagle nest sites adjacent to the boundary. Regeneration of the patches will be natural seeding from boundary trees and seed trees within the unit. Future stand treatments may involve limited thinning or sanitation to favor spruce, cedar and growth of trees with good form for timber. These treatments will also seek to maintain 10-30% of the trees as future snags and large trees for structural diversity. In order to achieve this, some areas within the unit may be left untreated.

UNIT 1 All Alternatives



Proposed Roads	Proposed cut units
Class 1 Streams	Adjacent proposed units
Class 2 Streams	Saltwater and Lakes
Class 3 Streams	TTRA Buffers
★ Eagle Nest Tree	Scale: 4 inches = 1 mile
E Proposed Log Transfer Facility	A Section PR1 Prescription

King George Timber Sale Unit Number 2 In Alternative 1, 2, 3, 4, 5

Compartment 156 VCU 462 Total Acres 297 Harvest Acres 297
Harvest method helicopter Volume Harvested 3707 MBF

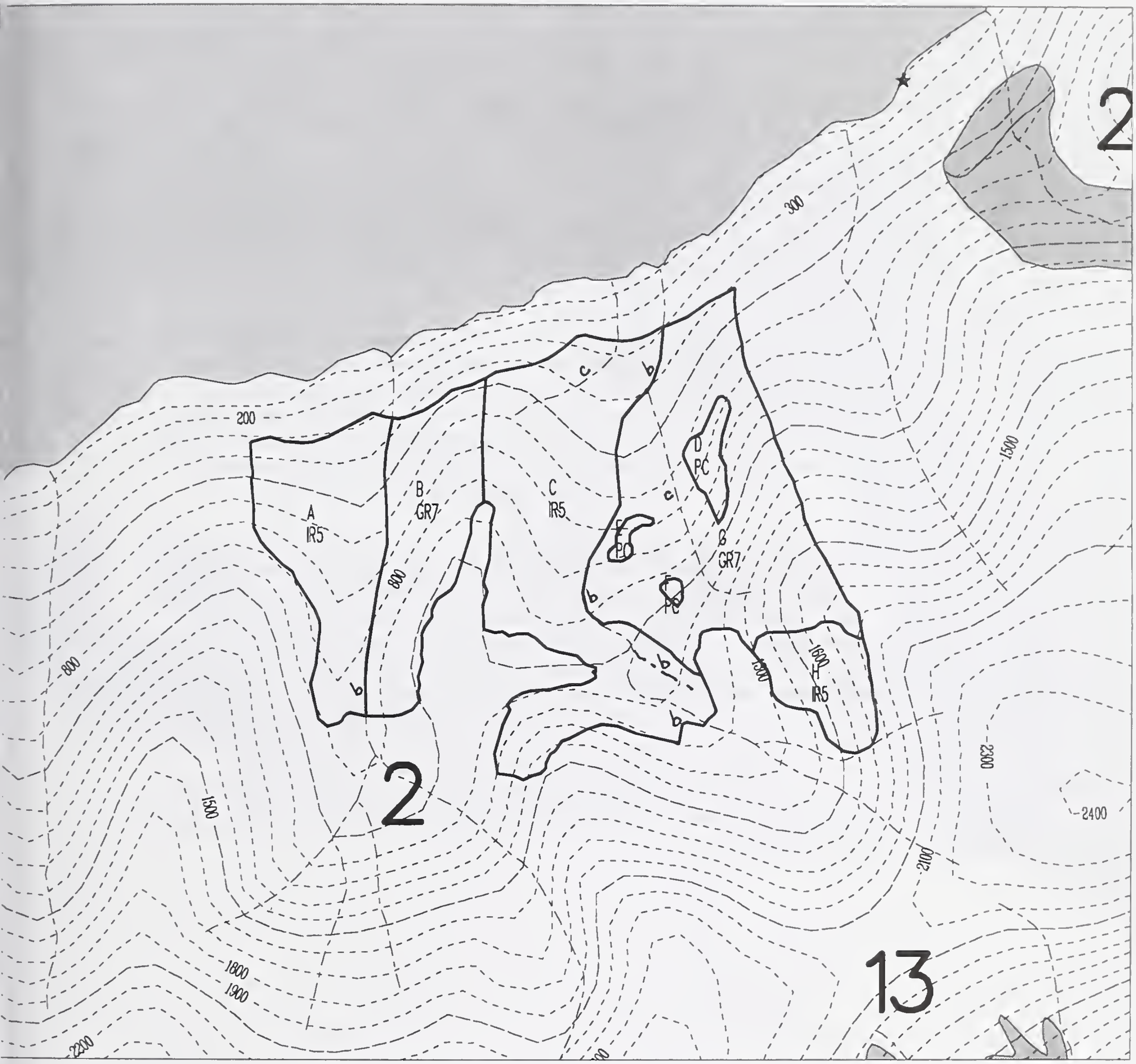
EXISTING CONDITION:
The unit is visible Chichagof pass and Zimovia Strait. The unit is located in the Chichagof land unit. Most of the unit lies in two small valleys with steep mountain slopes dividing them. There are five class III streams within this unit. Stream sideslopes in the upper portion of section C are actively eroding. There is extensive porcupine activity and bole rot within the western hemlock. There are existing small pockets of hemlock sawfly in the northern portion of this unit, along the unit boundary. There are a few areas of blowdown in the northern portion of the unit, consisting of approximately 1-3 acres in size. This unit contains about 50 acres of soil types with very high hazard stability rating. This unit also contains 26 acres of forested wetlands.

DESIRED CONDITION:
The desired condition of this unit is to harvest timber over a 150 year rotation and meet partial retention. Harvest will maintain a moderate to high amount of retention through the unit, which will minimize fragmentation. Maintain stilted root trees of any species, snags, trees with large branches (greater than 3") for nesting platforms and large diameter trees with heart rot for cavity nesting birds. Harvest activity will mimic natural vegetative patterns such as blowdown or disease pockets. Maintain slope stability and water quality. Recreational and ferry/cruise ship passengers may notice harvest, but it should appear as a natural disturbance dispersed over the landscape.

PRESCRIPTION DIRECTION:
The objectives of this unit can best be met by uneven-aged management. The unit is divided into several sections in order to implement harvest prescriptions in the following manner. Sections A, C, & H will be harvested by individual tree selection while retaining 50% of the basal area over these sections. Sections B & G will be harvested by group selection and retain 70% of the basal area within these sections. Section D, E, F, will be harvested by patch cut while retaining seedtrees of yellow-cedar and Sitka spruce whenever possible. Retention should be as windfirm as possible, particularly along 'b' streams. It is not possible to build a road to this unit from the LTF, therefore it will be harvested by helicopter. The affect on forested wetlands will be low because they will be helicopter yarded. Areas with soil types that are rated very high hazard stability will only be harvested where slopes are less than 75%, to minimize potential slope failure. Regeneration of the harvested areas will be natural seeding by adjacent trees and seed trees. Future stand treatments may involve limited thinning or sanitation to favor spruce, cedar and growth of trees with good form for timber. These treatments will also seek to maintain 10-30% of the trees as future snags and large trees for structural diversity. In order to achieve this, some areas within the unit may be left untreated. Protection of streams are shown on unit map. Avoid additional sideslope disturbance.

Harvest in this stand will not create any openings greater than 100 acres.

UNIT 2 All Alternatives



Proposed Roads	Proposed cut units
Class 1 Streams	Adjacent proposed units
Class 2 Streams	Saltwater and Lakes
Class 3 Streams	TTRA Buffers
★ Eagle Nest Tree	Scale: 4 inches = 1 mile
E Proposed Log Transfer Facility	A Section PR1 Prescription

King George Timber Sale Unit Number 3 In Alternative 1, 4, 5

Compartment 156 VCU 462 Total Acres 10 or 35 Harvest Acres 10 or 35
Harvest method cable or helicopter Volume Harvested by cable 248 MBF
Volume Harvested by helicopter 665 MBF

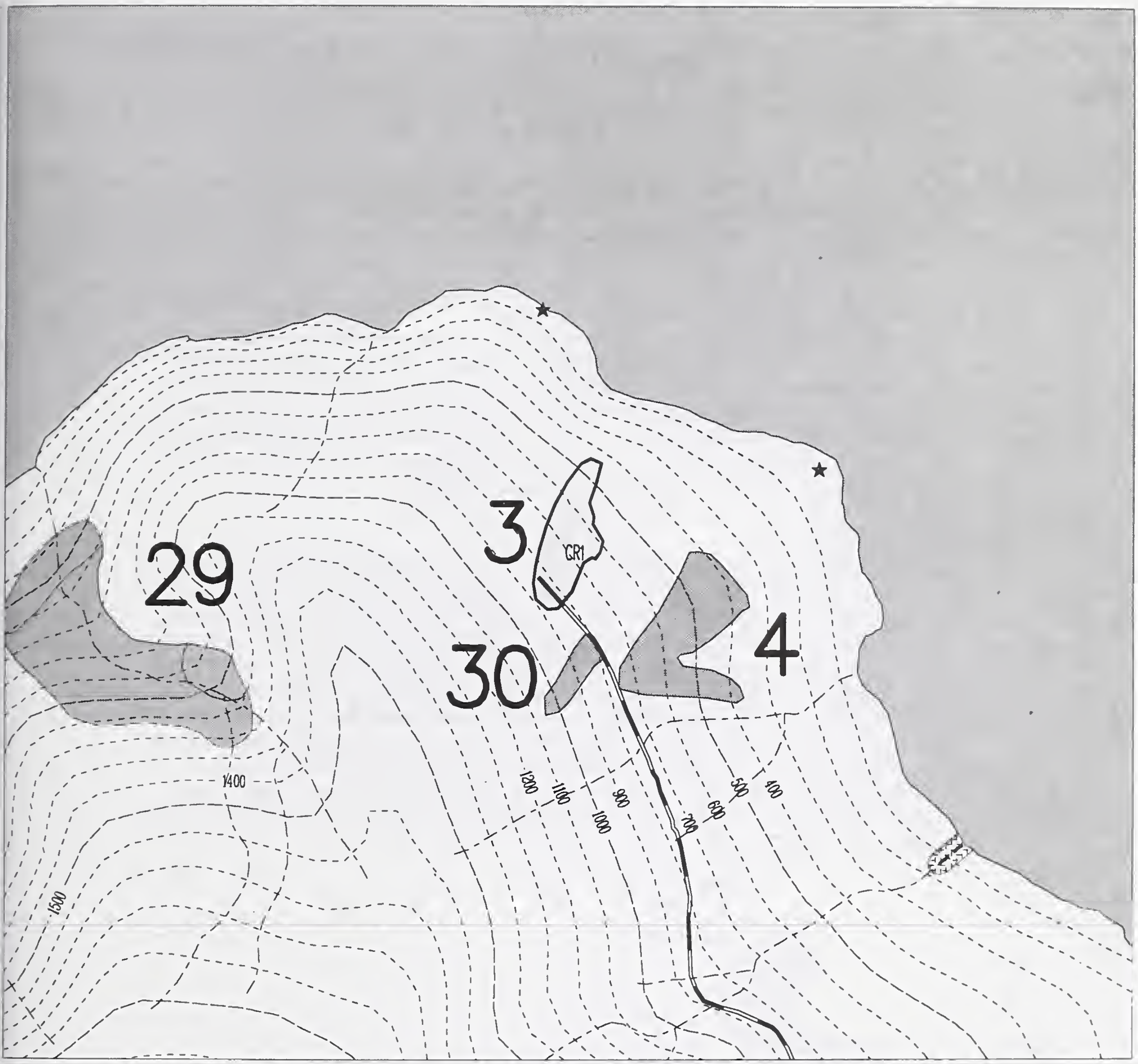
EXISTING CONDITION:
The unit is located in the Zimovia Face land unit and is visible from Zimovia Strait and Zimovia highway. There are no mapped streams within this unit. There is extensive porcupine activity and bole rot within the western hemlock. This unit contains 4 acres of forested wetlands in the cable option. This unit is located within high quality deer habitat and a third of this unit is located within high quality marten habitat.

DESIRED CONDITION:
The desired condition of this unit is to harvest timber over a 100-150 year rotation and meet partial retention. Harvest will maintain a slight amount of retention utilizing the cable option and a moderate amount using the helicopter option. Maintain stilted root trees of any species, snags, trees with large branches (greater than 3") for nesting platforms and large diameter trees with heart rot for cavity nesting birds. Harvest activity will mimic natural vegetative patterns such as blowdown or disease pockets using the helicopter option and mimic a landslide using the cable option. Recreational and ferry/cruise ship passengers may notice harvest, but it should appear as a natural disturbance.

PRESCRIPTION DIRECTION:
Depending on the road option chosen, the unit will be managed as an even-aged stand if cable yarded or an uneven-aged stand if helicopter yarded. Under the roaded option, this unit will retain 10 % of the basal area. Under the helicopter option, the unit is divided into several sections in order to implement harvest prescriptions in the following manner. Section A will be harvested by individual tree selection which will retain 50% of the basal area over this section. Section B will be harvested by clearcutting. Section C will be harvested by individual tree selection while retaining 10 % of the basal area. Treatments in section A will use a variety of prescriptions. Retention should be as windfirm as possible. Regeneration of harvested areas will be naturally seeded by adjacent trees and seed trees. Future stand treatments may involve limited thinning or sanitation to favor spruce, cedar and growth of trees with good form for timber. These treatments will also seek to maintain 10-20% of the trees as future snags and large trees for structural diversity in the helicopter option. In order to achieve this, some areas within the unit may be left untreated, if the helicopter harvest method is used.

UNIT 3

Alternative 5



Proposed Roads

Class 1 Streams

Class 2 Streams

Class 3 Streams

Eagle Nest Tree

E Proposed Log Transfer Facility

Proposed cut units

Adjacent proposed units

Saltwater and Lakes

TTRA Buffers

Scale: 4 inches = 1 mile

A Section

PR1 Prescription

King George Timber Sale Unit Number 3 In Alternative 1, 4, 5

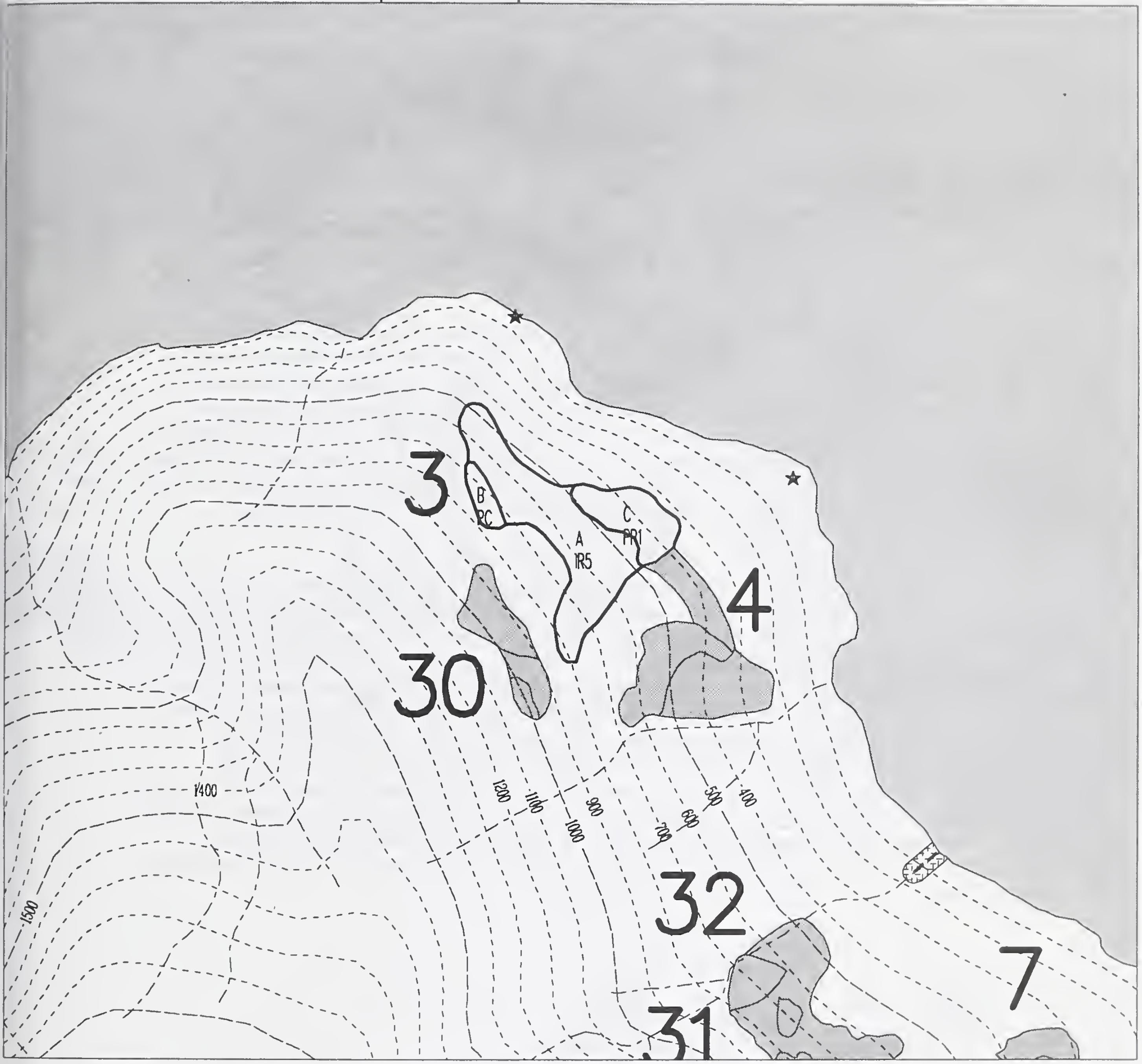
Compartment 156 VCU 462 Total Acres 10 or 35 Harvest Acres 10 or 35
Harvest method cable or helicopter Volume Harvested by cable 248 MBF
Volume Harvested by helicopter 665 MBF

EXISTING CONDITION:
The unit is located in the Zimovia Face land unit and is visible from Zimovia Strait and Zimovia highway. There are no mapped streams within this unit. There is extensive porcupine activity and bole rot within the western hemlock. This unit contains 4 acres of forested wetlands in the cable option. This unit is located within high quality deer habitat and a third of this unit is located within high quality marten habitat.

DESIRED CONDITION:
The desired condition of this unit is to harvest timber over a 100-150 year rotation and meet partial retention. Harvest will maintain a slight amount of retention utilizing the cable option and a moderate amount using the helicopter option. Maintain stilted root trees of any species, snags, trees with large branches (greater than 3") for nesting platforms and large diameter trees with heart rot for cavity nesting birds. Harvest activity will mimic natural vegetative patterns such as blowdown or disease pockets using the helicopter option and mimic a landslide using the cable option. Recreational and ferry/cruise ship passengers may notice harvest, but it should appear as a natural disturbance.

PRESCRIPTION DIRECTION:
Depending on the road option chosen, the unit will be managed as an even-aged stand if cable yarded or an uneven-aged stand if helicopter yarded. Under the roaded option, this unit will retain 10 % of the basal area. Under the helicopter option, the unit is divided into several sections in order to implement harvest prescriptions in the following manner. Section A will be harvested by individual tree selection which will retain 50% of the basal area over this section. Section B will be harvested by clearcutting. Section C will be harvested by individual tree selection while retaining 10 % of the basal area. Treatments in section A will use a variety of prescriptions. Retention should be as windfirm as possible. Regeneration of harvested areas will be naturally seeded by adjacent trees and seed trees. Future stand treatments may involve limited thinning or sanitation to favor spruce, cedar and growth of trees with good form for timber. These treatments will also seek to maintain 10-20% of the trees as future snags and large trees for structural diversity in the helicopter option. In order to achieve this, some areas within the unit may be left untreated, if the helicopter harvest method is used.

UNIT 3 - Helicopter Option - Alternatives 1 & 4



Proposed Roads

Class 1 Streams

Class 2 Streams

Class 3 Streams

Eagle Nest Tree

E Proposed Log Transfer Facility

Proposed cut prescriptions

Adjacent proposed units

Saltwater and Lakes

TTRA Buffers

Scale/ 4 inches = 1 mile

A Section

PR1 Prescription

King George Timber Sale Unit Number 4 In Alternative 1, 4, 5

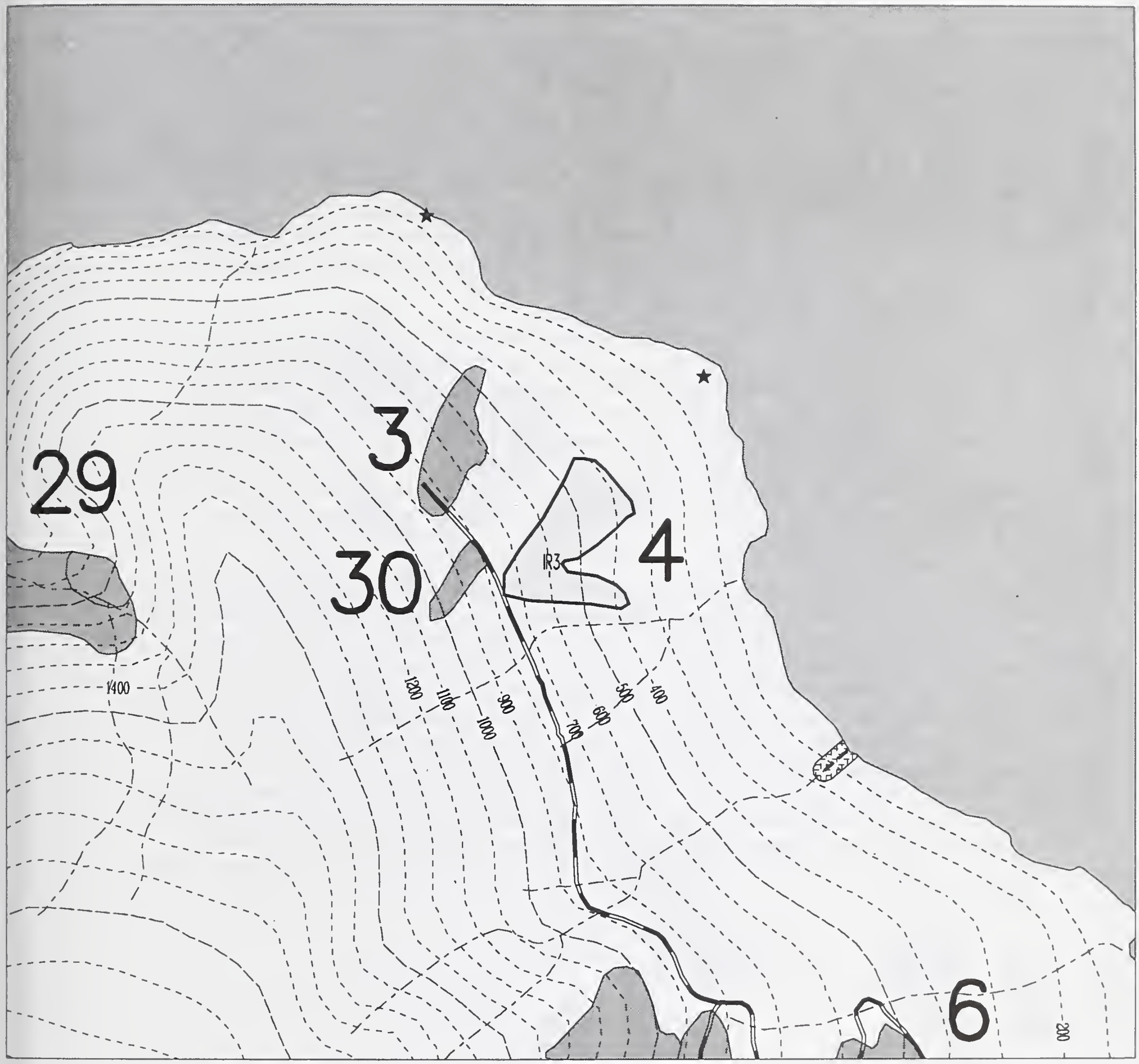
Compartment 156 VCU 462 Total Acres 19 or 24 Harvest Acres 19 or 24
Harvest method cable or helicopter Volume Harvested by cable 502 MBF
Volume Harvested by helicopter 440 MBF

EXISTING CONDITION:
The unit is located in the Zimovia Face land unit and is visible from Zimovia Strait and Zimovia highway. There are no mapped streams within this unit. There is extensive porcupine activity and bole rot within the western hemlock. This unit contains 7 acres of forested wetlands in the cable option. This unit is located within high quality deer habitat and a third of this unit is located within high quality marten habitat.

DESIRED CONDITION:
The desired condition of this unit is to harvest timber over a 100-150 year rotation and meet partial retention. Harvest will maintain a slight amount of retention utilizing the cable option and a moderate amount using the helicopter option. Maintain stilted root trees of any species, snags, trees with large branches (greater than 3") for nesting platforms and large diameter trees with heart rot for cavity nesting birds. Harvest activity will mimic natural vegetative patterns such as blowdown or disease pockets using the helicopter option and mimic a landslide using the cable option. Reduce some of the visual impact of the backline in the existing harvest unit. Recreational and ferry/cruise ship passengers may notice harvest, but it should appear as a natural disturbance. Reduce gray tones in the landscape due to cedar decline.

PRESCRIPTION DIRECTION:
Depending on which road option is chosen, the unit will be managed as an even-aged stand if cable yarded or an uneven-aged stand if helicopter yarded. Under the road option, this unit will retain 30 % of the basal area within leave patches. Under the helicopter option, the unit is divided into several sections in order to implement harvest prescriptions in the following manner. Section A will be harvested by individual tree selection which will retain 50% of the basal area over this section. Section B will be harvested by removing the overstory which consists of yellow-cedar decline. Section C will be harvested by group selection while retaining 70 % of the basal area within this section. Treatments in section A will use a variety of prescriptions. Retention should be as windfirm as possible. Regeneration of harvested areas will be naturally seeded by adjacent trees and seed trees from within the unit. Future stand treatments may involve limited thinning or sanitation to favor spruce, cedar and growth of trees with good form for timber. These treatments will also seek to maintain 10-20% of the trees as future snags and large trees for structural diversity. In order to achieve this, some areas within the unit may be left untreated, if the helicopter harvest method is used.

UNIT 4 Alternative 5



Proposed Roads

Class 1 Streams

Class 2 Streams

Class 3 Streams

★ Eagle Nest Tree

E Proposed Log Transfer Facility

Proposed cut units

Adjacent proposed units

Saltwater and Lakes

TTRA Buffers

Scale: 4 inches = 1 mile

A Section
PR1 Prescription

King George Timber Sale Unit Number 4 In Alternative 1, 4, 5

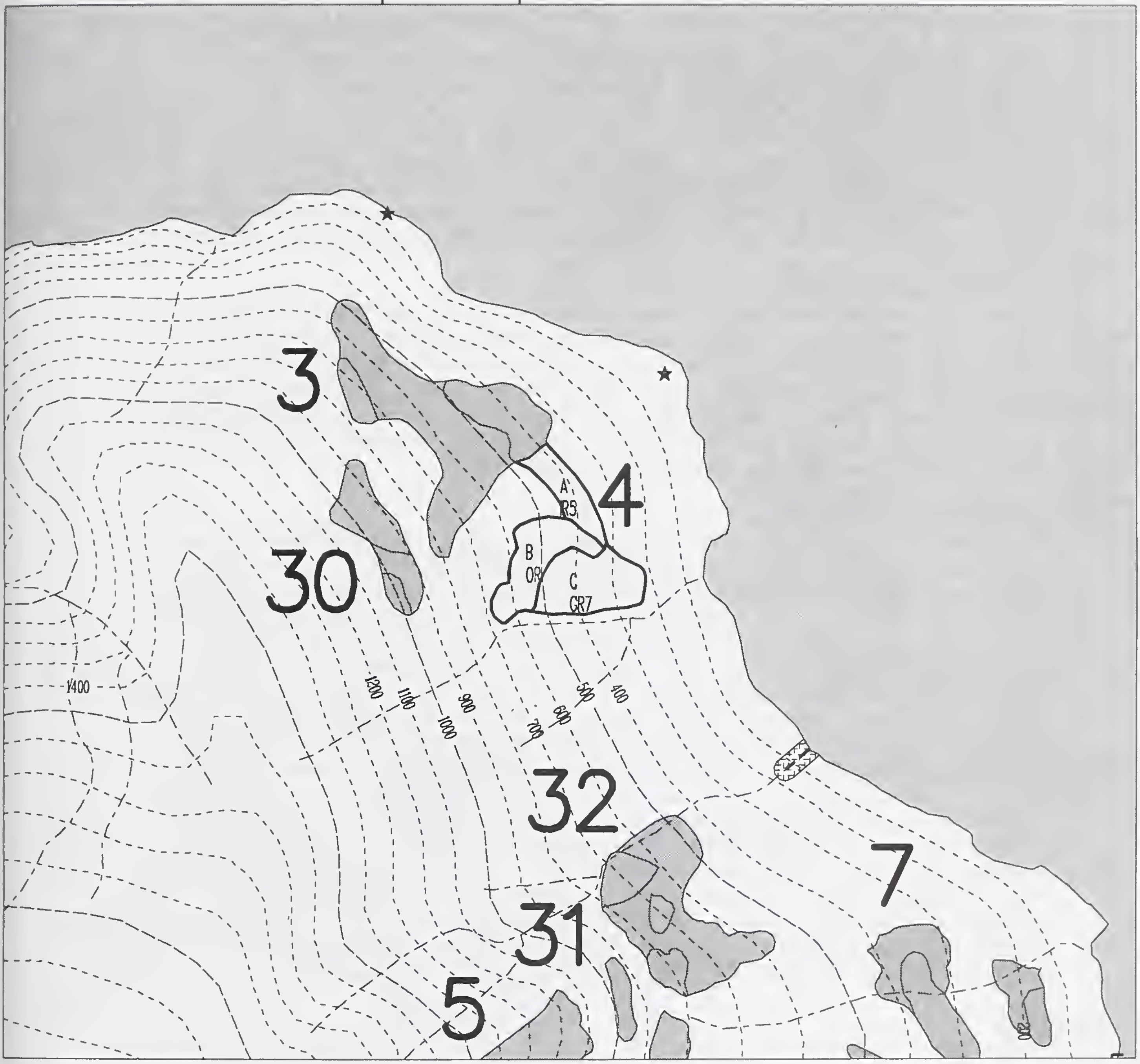
Compartment 156 VCU 462 Total Acres 19 or 24 Harvest Acres 19 or 24
Harvest method cable or helicopter Volume Harvested by cable 502 MBF
Volume Harvested by helicopter 440 MBF

EXISTING CONDITION:
The unit is located in the Zimovia Face land unit and is visible from Zimovia Strait and Zimovia highway. There are no mapped streams within this unit. There is extensive porcupine activity and bole rot within the western hemlock. This unit contains 7 acres of forested wetlands in the cable option. This unit is located within high quality deer habitat and a third of this unit is located within high quality marten habitat.

DESIRED CONDITION:
The desired condition of this unit is to harvest timber over a 100-150 year rotation and meet partial retention. Harvest will maintain a slight amount of retention utilizing the cable option and a moderate amount using the helicopter option. Maintain stilted root trees of any species, snags, trees with large branches (greater than 3") for nesting platforms and large diameter trees with heart rot for cavity nesting birds. Harvest activity will mimic natural vegetative patterns such as blowdown or disease pockets using the helicopter option and mimic a landslide using the cable option. Reduce some of the visual impact of the backline in the existing harvest unit. Recreational and ferry/cruise ship passengers may notice harvest, but it should appear as a natural disturbance. Reduce gray tones in the landscape due to cedar decline.

PRESCRIPTION DIRECTION:
Depending on which road option is chosen, the unit will be managed as an even-aged stand if cable yarded or an uneven-aged stand if helicopter yarded. Under the road option, this unit will retain 30 % of the basal area within leave patches. Under the helicopter option, the unit is divided into several sections in order to implement harvest prescriptions in the following manner. Section A will be harvested by individual tree selection which will retain 50% of the basal area over this section. Section B will be harvested by removing the overstory which consists of yellow-cedar decline. Section C will be harvested by group selection while retaining 70 % of the basal area within this section. Treatments in section A will use a variety of prescriptions. Retention should be as windfirm as possible. Regeneration of harvested areas will be naturally seeded by adjacent trees and seed trees from within the unit. Future stand treatments may involve limited thinning or sanitation to favor spruce, cedar and growth of trees with good form for timber. These treatments will also seek to maintain 10-20% of the trees as future snags and large trees for structural diversity. In order to achieve this, some areas within the unit may be left untreated, if the helicopter harvest method is used.

UNIT 4 - Helicopter Option - Alternatives 1 & 4



Proposed Roads
Class 1 Streams
Class 2 Streams
Class 3 Streams
★ Eagle Nest Tree
E Proposed Log Transfer Facility

Proposed cut prescriptions
Adjacent proposed units
Saltwater and Lakes
TTRA Buffers

Scale/ 4 inches = 1 mile
A Section
PR1 Prescription

King George Timber Sale Unit Number 5 In Alternative 1, 4, 5

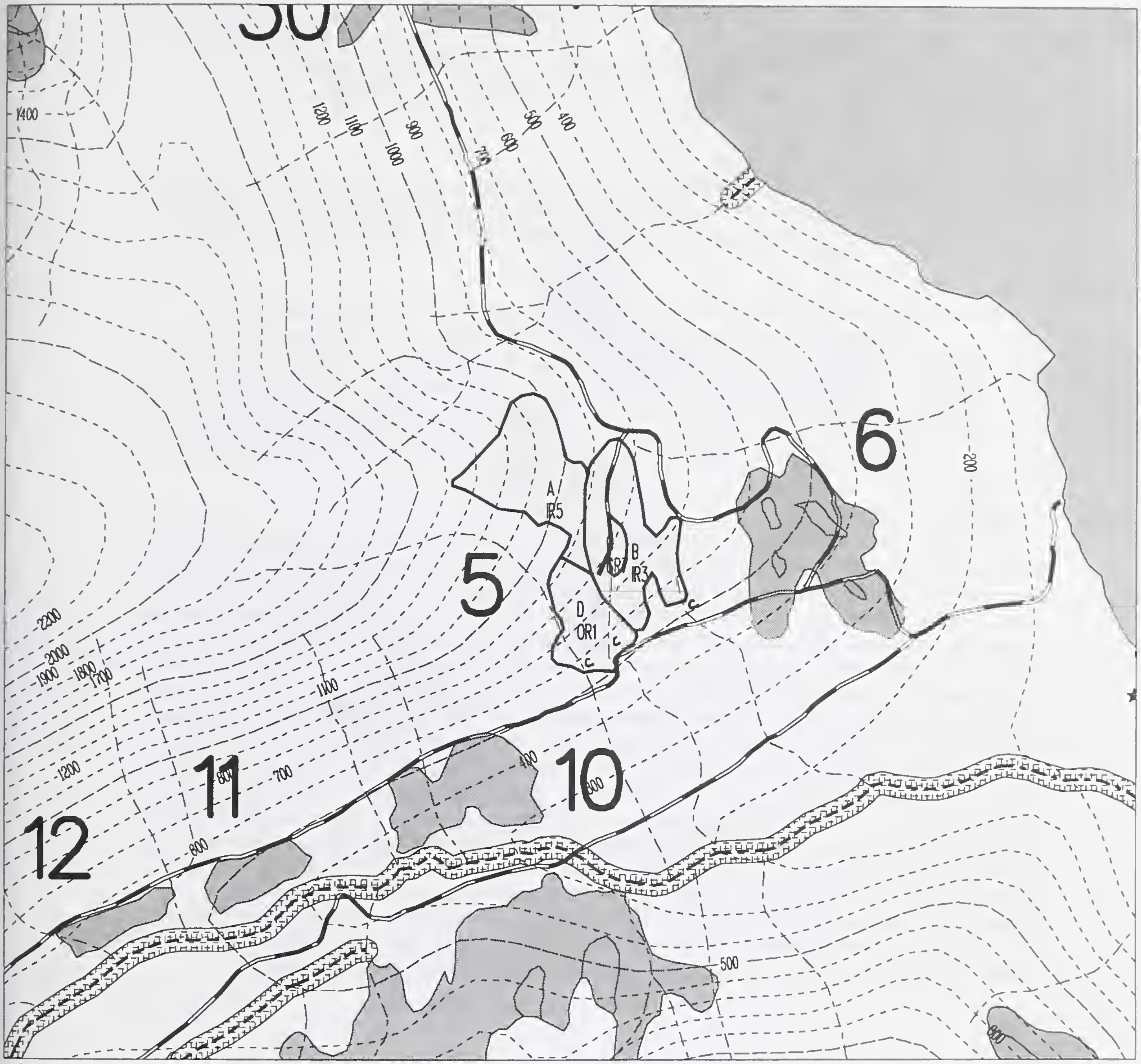
Compartment 156 VCU 462 Total Acres 50 or 63 Harvest Acres 50 or 63
Harvest method cable or helicopter Volume Harvested by cable 1152 MBF
Volume Harvested by helicopter 1316 MBF

EXISTING CONDITION:
The unit is located in the Zimovia Face land unit and is visible from Zimovia Strait and Zimovia highway. There are three class III streams within this unit. There is extensive porcupine activity and bole rot within the western hemlock. There is a significant amount of cedar decline in the southern portion of this unit.

DESIRED CONDITION:
The desired condition of this unit is to harvest timber over a 100-150 year rotation and meet partial retention. Harvest will maintain a moderate amount of retention through the unit, which will reduce fragmentation. Maintain stilted root trees of any species, snags, trees with large branches (greater than 3") for nesting platforms and large diameter trees with heart rot for cavity nesting birds. Harvest activity will mimic natural vegetative patterns such as blowdown or disease pockets. Recreational and ferry/cruise ship passengers may notice harvest, but it should appear as a natural disturbance dispersed over the landscape. Maintain stream channel stability and minimize sideslope disturbance.

PRESCRIPTION DIRECTION:
The objectives of this unit can best be met by uneven-aged management. The unit is divided into several sections in order to implement harvest prescriptions in the following manner. Sections A & D will be harvested by helicopter under the cable and helicopter options because of the visibility and steepness of the slope. Section A will be harvested by individual tree selection which will retain 50% of the basal area over this section. Section B will be harvested by individual tree selection and retain 30% of the basal area in the cable option or this section will be harvested in groups and retain 70% of the basal area in the helicopter option. Section C will be harvested in groups and retain 70% of the basal in the cable option or this section will be harvested by individual tree selection and retaining 10 % of the basal area in the helicopter option. Section D will be harvested by overstory removal in both the cable and helicopter options, harvesting the cedar decline within this section. Not cutting the understory will leave about 10 % retention within this section. Treatments in section A and section B under the cable option will use a variety of prescriptions. This unit will be perceived as a gradual change over time from travel routes. Retention should be as windfirm as possible, particularly adjacent to streams. Regeneration of harvested areas will be naturally seeded by adjacent trees and seed trees from within the unit. Future stand treatments may involve limited thinning or sanitation to favor spruce, cedar and growth of trees with good form for timber. These treatments will also seek to maintain 10-30% of the trees as future snags and large trees for structural diversity. In order to achieve this, some areas within the unit may be left untreated. Protection for streams is shown on unit map. If section D changes to cable, stream protection clauses may change.

UNIT 5 — Alternatives 4 & 5



Proposed Roads

Class 1 Streams

Class 2 Streams

Class 3 Streams

★ Eagle Nest Tree

E Proposed Log Transfer Facility

Proposed cut units

Adjacent proposed units

Saltwater and Lakes

TTRA Buffers

Scale: 4 inches = 1 mile

A Section
PR1 Prescription

King George Timber Sale Unit Number 5 In Alternative 1, 4, 5

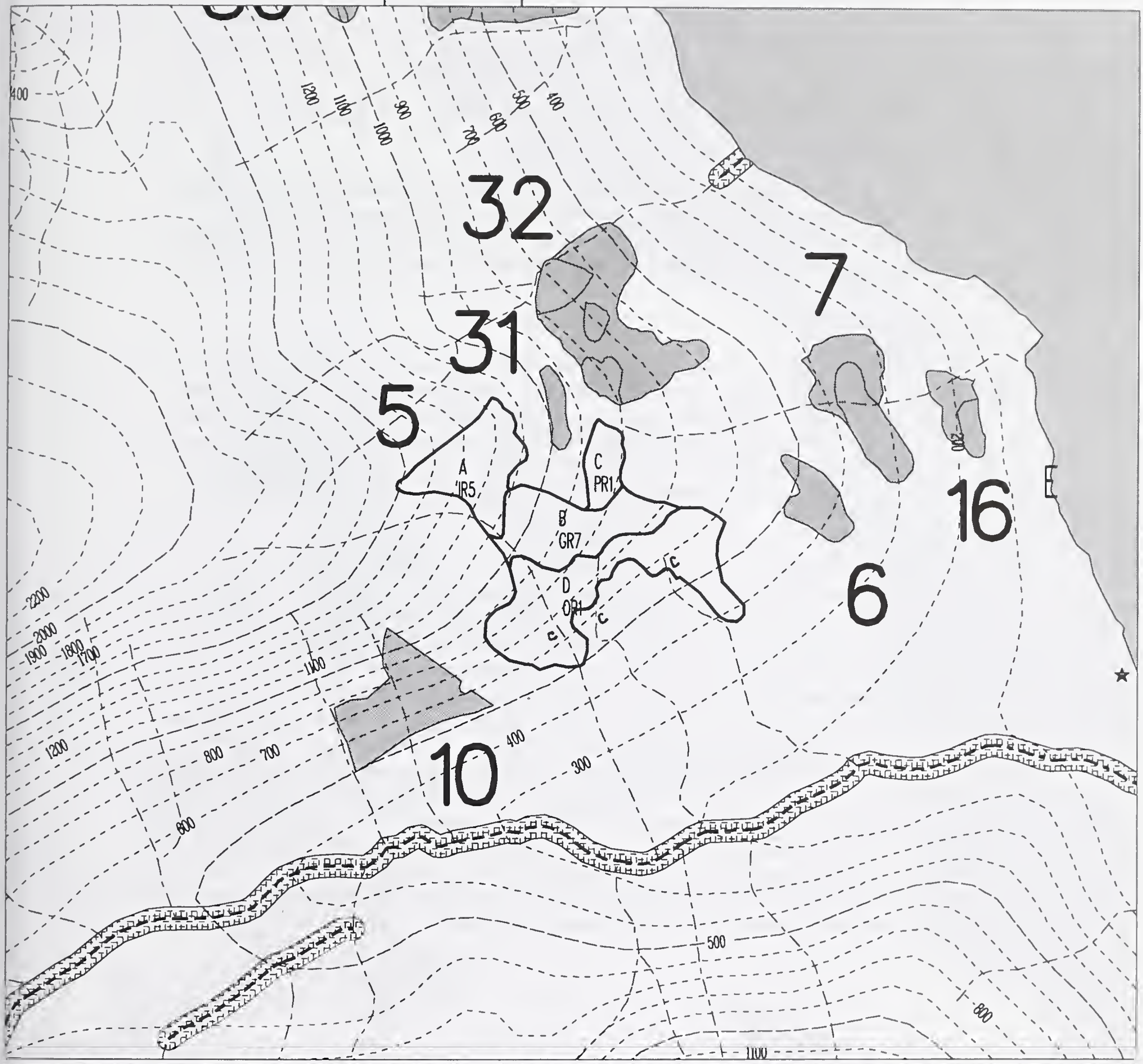
Compartment 156 VCU 462 Total Acres 50 or 63 Harvest Acres 50 or 63
Harvest method cable or helicopter Volume Harvested by cable 1152 MBF
Volume Harvested by helicopter 1316 MBF

EXISTING CONDITION:
The unit is located in the Zimovia Face land unit and is visible from Zimovia Strait and Zimovia highway. There are three class III streams within this unit. There is extensive porcupine activity and bole rot within the western hemlock. There is a significant amount of cedar decline in the southern portion of this unit.

DESIRED CONDITION:
The desired condition of this unit is to harvest timber over a 100-150 year rotation and meet partial retention. Harvest will maintain a moderate amount of retention through the unit, which will reduce fragmentation. Maintain stilted root trees of any species, snags, trees with large branches (greater than 3") for nesting platforms and large diameter trees with heart rot for cavity nesting birds. Harvest activity will mimic natural vegetative patterns such as blowdown or disease pockets. Recreational and ferry/cruise ship passengers may notice harvest, but it should appear as a natural disturbance dispersed over the landscape. Maintain stream channel stability and minimize sideslope disturbance.

PRESCRIPTION DIRECTION:
The objectives of this unit can best be met by uneven-aged management. The unit is divided into several sections in order to implement harvest prescriptions in the following manner. Sections A & D will be harvested by helicopter under the cable and helicopter options because of the visibility and steepness of the slope. Section A will be harvested by individual tree selection which will retain 50% of the basal area over this section. Section B will be harvested by individual tree selection and retain 30% of the basal area in the cable option or this section will be harvested in groups and retain 70% of the basal area in the helicopter option. Section C will be harvested in groups and retain 70% of the basal in the cable option or this section will be harvested by individual tree selection and retaining 10 % of the basal area in the helicopter option. Section D will be harvested by overstory removal in both the cable and helicopter options, harvesting the cedar decline within this section. Not cutting the understory will leave about 10 % retention within this section. Treatments in section A and section B under the cable option will use a variety of prescriptions. This unit will be perceived as a gradual change over time from travel routes. Retention should be as windfirm as possible, particularly adjacent to streams. Regeneration of harvested areas will be naturally seeded by adjacent trees and seed trees from within the unit. Future stand treatments may involve limited thinning or sanitation to favor spruce, cedar and growth of trees with good form for timber. These treatments will also seek to maintain 10-30% of the trees as future snags and large trees for structural diversity. In order to achieve this, some areas within the unit may be left untreated. Protection for streams is shown on unit map. If section D changes to cable, stream protection clauses may change.

UNIT 5 – Helicopter Option – Alternative 1



Proposed Roads

Class 1 Streams

Class 2 Streams

Class 3 Streams

★ Eagle Nest Tree

E Proposed Log Transfer Facility

Proposed cut prescriptions

Adjacent proposed units

Saltwater and Lakes

TTRA Buffers

Scale/ 4 inches = 1 mile

A Section

PR1 Prescription

King George Timber Sale Unit Number 6 In Alternative 1, 3, 4, 5

Compartment 156 VCU 462 Total Acres 32 or 6 Harvest Acres 32 or 6
Harvest method cable or helicopter
Volume Harvested by cable 688 MBF Volume Harvested by helicopter 126 MBF

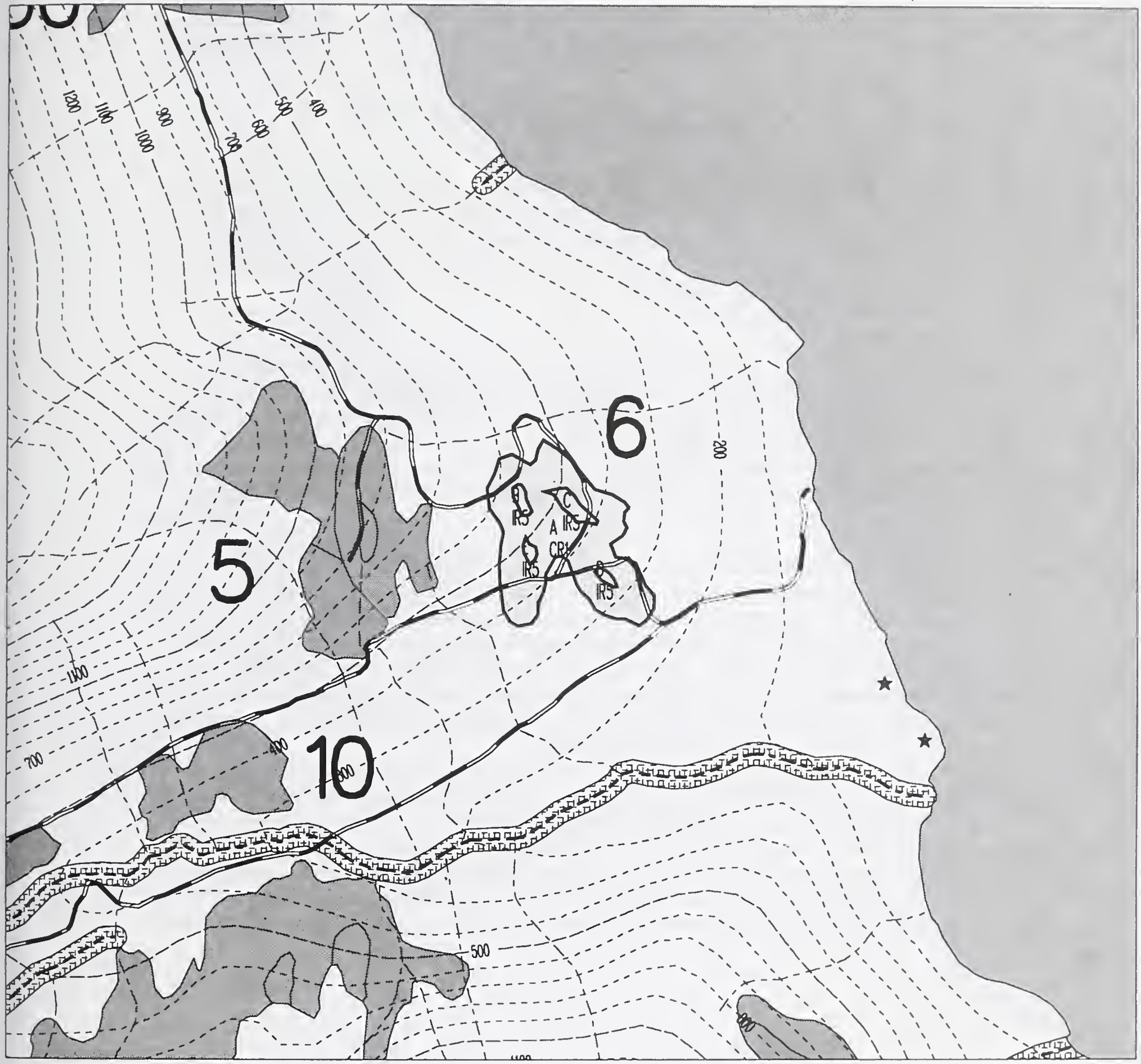
EXISTING CONDITION:
The unit is located in the Honeymoon land unit and is visible from Zimovia Strait and Zimovia highway, Nemo road and Pat's Creek LTF on Wrangell Island. There are no mapped streams within this unit. There is extensive porcupine activity and bole rot within the western hemlock. There are some culturally modified redcedar within this unit. There are 2 acres of forested wetlands in the southeast corner of this unit.

DESIRED CONDITION:
The desired condition of this unit is to harvest timber over a 100-150 year rotation and meet partial retention. Harvest will maintain a slight to moderate amount of retention through the unit, which will reduce visual impacts. Maintain stilted root trees of any species, snags, trees with large branches (greater than 3") for nesting platforms and large diameter trees with heart rot for cavity nesting birds. Harvest activity will mimic natural vegetative patterns such as blowdown or disease pockets. Recreational and ferry/cruise ship passengers may notice harvest, but it should appear as a natural disturbance pattern dispersed over the landscape.

PRESCRIPTION DIRECTION:
The objectives of this unit can best be met by either a two-aged stand or by uneven-aged management. In the cable option, this unit is divided into several sections in order to implement harvest prescriptions in the following manner. Sections B, C, D & E will be harvested by individual tree selection which will retain 50% of the basal area over these sections. Section A will be harvested by individual tree selection and retain 10% of the basal area. The 2 acres of forested wetlands will be harvested by cable to avoid soil disturbance or special consideration will be taken in shovel logging layout. In the cable option, logging slash may be YUM yarded and separated, chipped or burned.
Treatments in the helicopter option will use individual tree selection and retain 10 % of the basal area. Retention should be as windfirm as possible. Regeneration of harvested areas will be naturally seeded by adjacent trees and seed trees from within the unit. Future stand treatments may involve limited thinning or sanitation to favor spruce, cedar and growth of trees with good form for timber. These treatments will also seek to maintain 5-10% of the trees as future snags and large trees for structural diversity. In order to achieve this, some areas within the unit may be left untreated. Leave culturally modified trees and smaller healthy trees around them in groups to minimize windthrow in the helicopter and shovel yarding methods.

UNIT 6

Alternatives 3, 4 & 5



Proposed Roads

Class 1 Streams

Class 2 Streams

Class 3 Streams

★ Eagle Nest Tree

E Proposed Log Transfer Facility

Proposed cut units

Adjacent proposed units

Saltwater and Lakes

TTRA Buffers

Scale: 4 inches = 1 mile

A Section
PR1 Prescription

King George Timber Sale Unit Number 6 In Alternative 1, 3, 4, 5

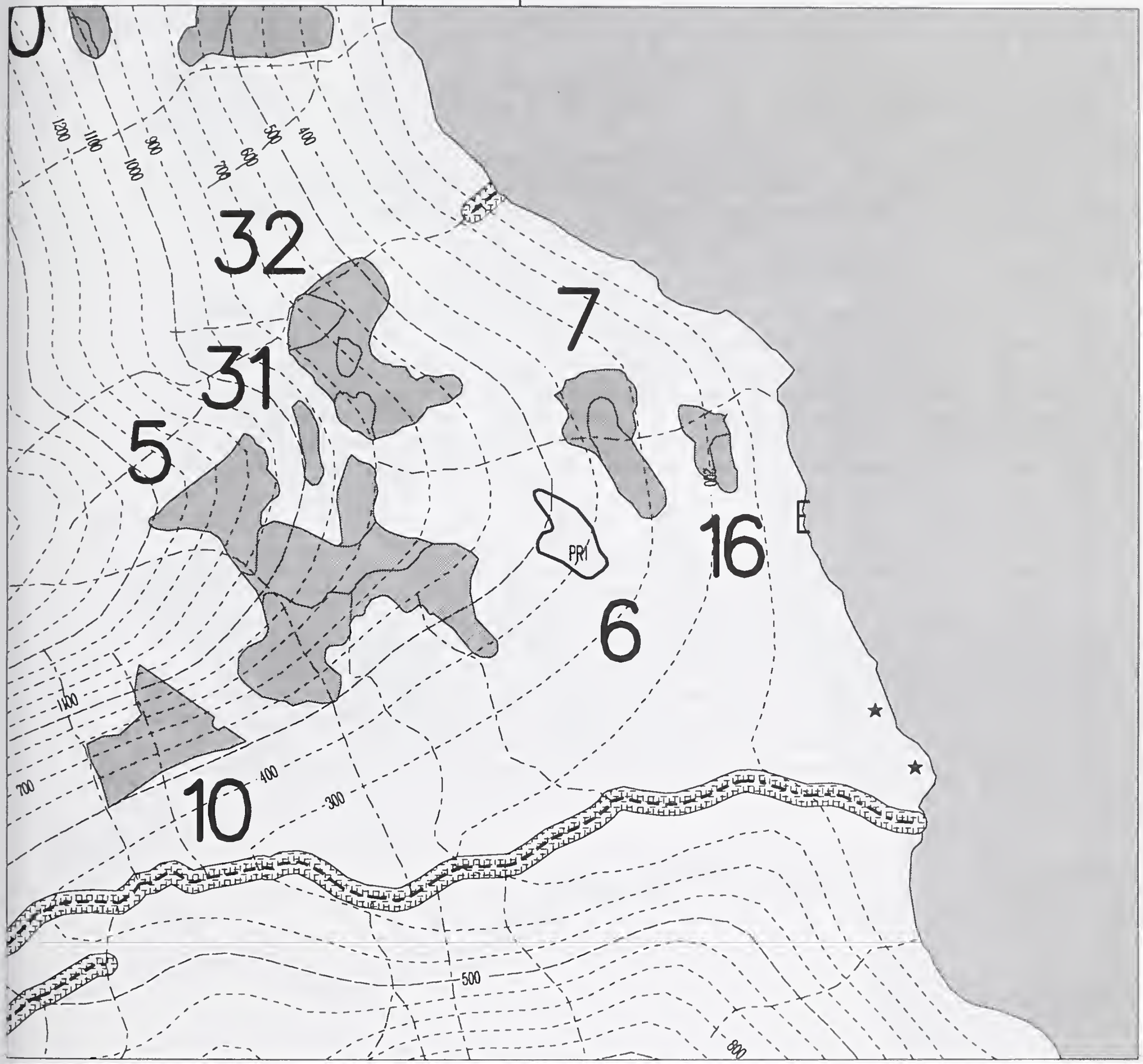
Compartment 156 VCU 462 Total Acres 32 or 6 Harvest Acres 32 or 6
Harvest method cable or helicopter
Volume Harvested by cable 688 MBF Volume Harvested by helicopter 126 MBF

EXISTING CONDITION:
The unit is located in the Honeymoon land unit and is visible from Zimovia Strait and Zimovia highway, Nemo road and Pat's Creek LTF on Wrangell Island. There are no mapped streams within this unit. There is extensive porcupine activity and bole rot within the western hemlock. There are some culturally modified redcedar within this unit. There are 2 acres of forested wetlands in the southeast corner of this unit.

DESIRED CONDITION:
The desired condition of this unit is to harvest timber over a 100-150 year rotation and meet partial retention. Harvest will maintain a slight to moderate amount of retention through the unit, which will reduce visual impacts. Maintain stilted root trees of any species, snags, trees with large branches (greater than 3") for nesting platforms and large diameter trees with heart rot for cavity nesting birds. Harvest activity will mimic natural vegetative patterns such as blowdown or disease pockets. Recreational and ferry/cruise ship passengers may notice harvest, but it should appear as a natural disturbance pattern dispersed over the landscape.

PRESCRIPTION DIRECTION:
The objectives of this unit can best be met by either a two-aged stand or by uneven-aged management. In the cable option, this unit is divided into several sections in order to implement harvest prescriptions in the following manner. Sections B, C, D & E will be harvested by individual tree selection which will retain 50% of the basal area over these sections. Section A will be harvested by individual tree selection and retain 10% of the basal area. The 2 acres of forested wetlands will be harvested by cable to avoid soil disturbance or special consideration will be taken in shovel logging layout. In the cable option, logging slash may be YUM yarded and separated, chipped or burned.
Treatments in the helicopter option will use individual tree selection and retain 10 % of the basal area. Retention should be as windfirm as possible. Regeneration of harvested areas will be naturally seeded by adjacent trees and seed trees from within the unit. Future stand treatments may involve limited thinning or sanitation to favor spruce, cedar and growth of trees with good form for timber. These treatments will also seek to maintain 5-10% of the trees as future snags and large trees for structural diversity. In order to achieve this, some areas within the unit may be left untreated. Leave culturally modified trees and smaller healthy trees around them in groups to minimize windthrow in the helicopter and shovel yarding methods.

UNIT 6 - Helicopter Option - Alternative 1



Proposed Roads

Class 1 Streams

Class 2 Streams

Class 3 Streams

★ Eagle Nest Tree

E Proposed Log Transfer Facility

Proposed cut prescriptions

Adjacent proposed units

Saltwater and Lakes

TTRA Buffers

Scale/ 4 inches = 1 mile

A Section

PR1 Prescription

King George Timber Sale Unit Number 7 In Alternative 1

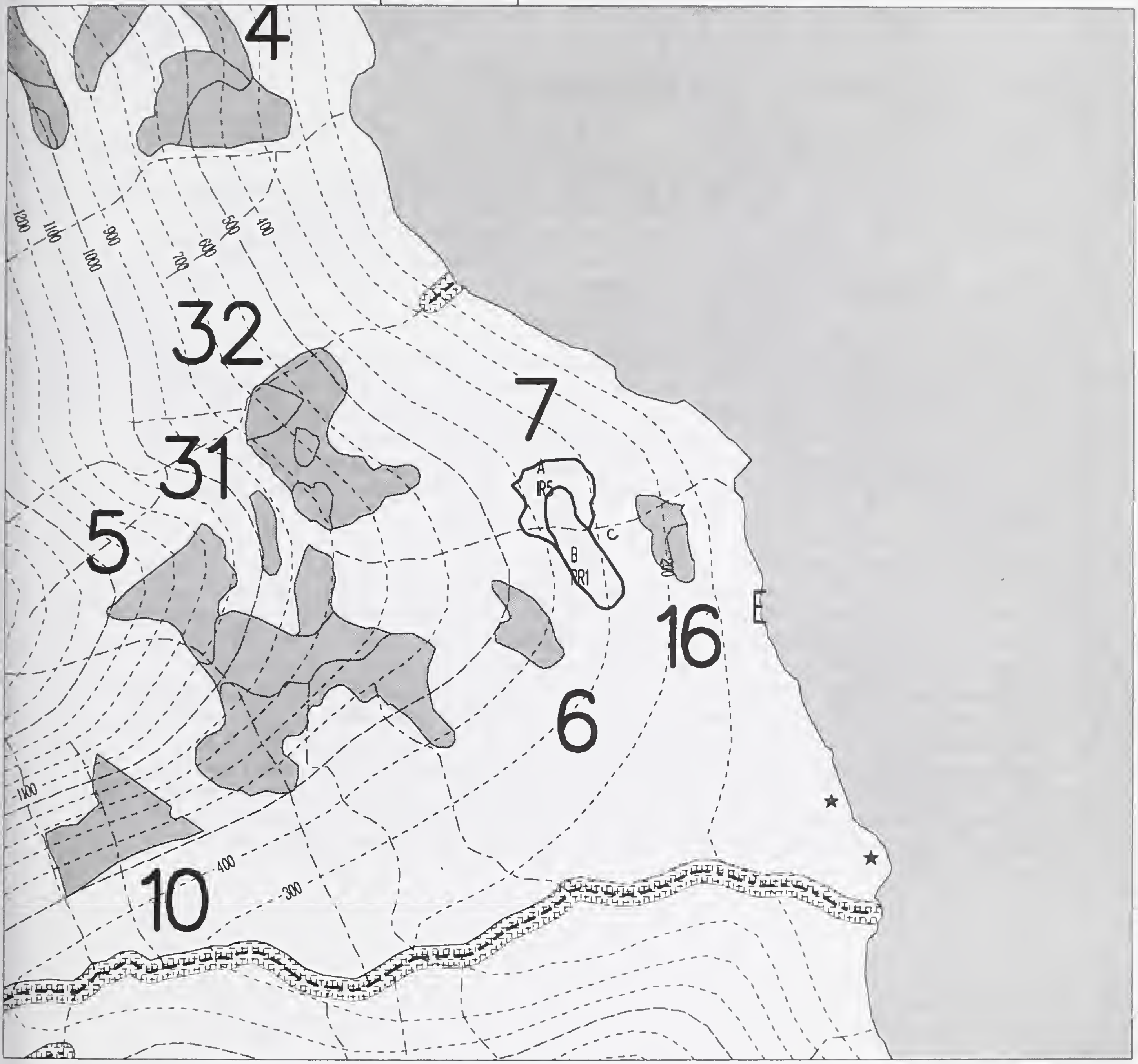
Compartment 156 VCU 462 Total Acres 14 Harvest Acres 14
Harvest method helicopter Volume Harvested 270 MBF

EXISTING CONDITION:
The unit is located in the Honeymoon land unit and is visible from Zimovia Strait and Zimovia highway. There is one class III stream within this unit. There is extensive porcupine activity and bole rot within the western hemlock. This unit is located within high quality deer, black bear, marten, elk and brown creeper habitat.

DESIRED CONDITION:
The desired condition of this unit is to harvest timber over a 100 year rotation and meet partial retention. Harvest will maintain a moderate amount of retention through the northern portion of the unit and a slight amount of retention in the southern portion. Maintain stilted root trees of any species, snags, trees with large branches (greater than 3") for nesting platforms and large diameter trees with heart rot for cavity nesting birds. Harvest activity will mimic natural vegetative patterns such as blowdown or disease pockets. Recreational and ferry/cruise ship passengers may notice harvest, but it should appear as a natural disturbance dispersed over the landscape. Reduce some of the visual impact of the backline in the existing harvest unit.

PRESCRIPTION DIRECTION:
The objectives of this unit can best be met by two-aged management. The unit is divided into two sections in order to implement harvest prescriptions in the following manner. Sections A will be harvested by individual tree selection which will retain 50% of the basal area. Section B will be harvested by individual tree selection and retain 10% of the basal area. This unit will be perceived as a gradual change over time from travel routes. Retention should be as windfirm as possible, particularly adjacent to the stream. Regeneration of harvested areas will be naturally seeded by adjacent trees and seed trees from within the unit. Future stand treatments may involve limited thinning or sanitation to favor spruce, cedar and growth of trees with good form for timber. These treatments will seek to maintain 5-10% of the trees as future snags and large trees for structural diversity. Streamcourse protection clause 'c' will be applied to the stream in this unit.

UNIT 7 - Helicopter Option - Alternative 1



Proposed Roads

Class 1 Streams

Class 2 Streams

Class 3 Streams

★ Eagle Nest Tree

E Proposed Log Transfer Facility

Proposed cut prescriptions

Adjacent proposed units

Saltwater and Lakes

TTRA Buffers

Scale/ 4 inches = 1 mile

A Section

PR1 Prescription

King George Timber Sale Unit Number 8 In Alternative 1, 3, 4, 5

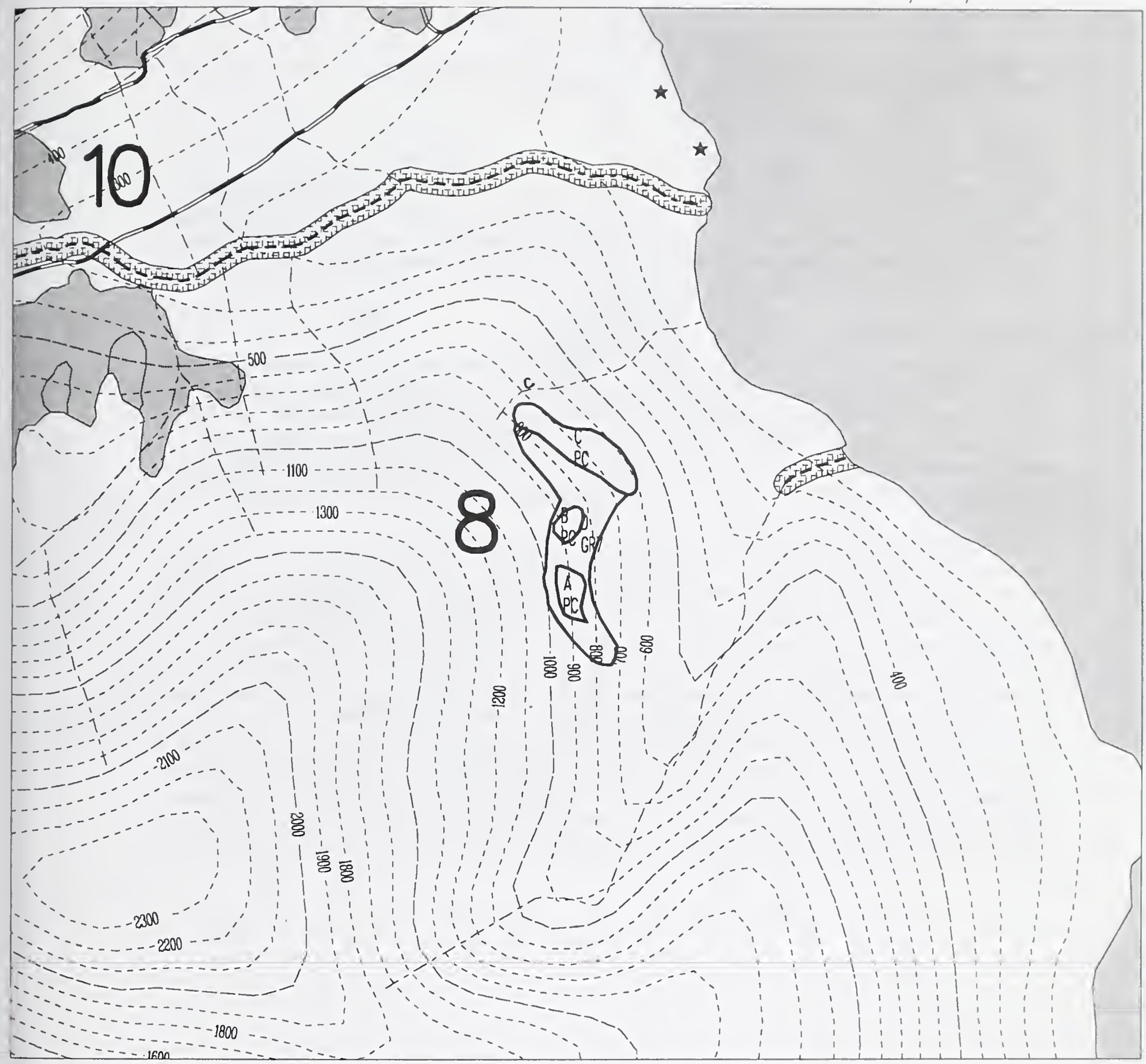
Compartment 156 VCU 462 Total Acres 26 Harvest Acres 26
Harvest method helicopter Volume Harvested 268 MBF

EXISTING CONDITION:
The unit is located in the Honeymoon and Porcupine Gulch land unit. This unit is visible from Zimovia Strait, Zimovia highway and a couple of the Nemo campsites. There are no mapped streams within this unit, however, a class III stream borders the unit to the north. There is extensive porcupine activity and bole rot within the western hemlock. There are 16 acres of forested wetlands within this unit. The landscape in this area has a low ability to absorb changes.

DESIRED CONDITION:
The desired condition of this unit is to harvest timber over a 150 year rotation and meet partial retention. Harvest will maintain a moderate amount of retention through the unit, which will reduce fragmentation. Maintain stilted root trees of any species, snags, trees with large branches (greater than 3") for nesting platforms and large diameter trees with heart rot for cavity nesting birds. Harvest activity will mimic natural vegetative patterns such as blowdown or disease pockets. Recreational and ferry/cruise ship passengers may notice harvest, but it should appear as a natural disturbance pattern dispersed over the landscape.

PRESCRIPTION DIRECTION:
The objectives of this unit can best be met by uneven-aged management. The unit is divided into several sections in order to implement harvest prescriptions in the following manner. Section D will be harvested by group selection which will retain 70% of the basal area within this section. Sections A, B and C will be harvested by the seed tree method. Seed trees will consist of western redcedar, yellow-cedar and Sitka spruce when ever possible. Retention should be as windfirm as possible, particularly adjacent to the stream. Regeneration of harvested areas will be naturally seeded by adjacent trees and seed trees. Future stand treatments may involve limited thinning or sanitation to favor spruce, or cedar and growth of trees with good form for timber. These treatments will also seek to maintain 10-30% of the trees as future snags and large trees for structural diversity. In order to achieve this, some areas within the unit may be left untreated. Harvesting this unit is expected to have minor effects to the wetland acres within this unit because of helicopter yarding and the high amount of retention that will be left within the unit. Streamcourse protection will be category 'c'.

UNIT 8 Alternatives 1, 3, 4 & 5



Proposed Roads	Proposed cut units
Class 1 Streams	Adjacent proposed units
Class 2 Streams	Saltwater and Lakes
Class 3 Streams	TTRA Buffers
★ Eagle Nest Tree	Scale: 4 inches = 1 mile
E Proposed Log Transfer Facility	A Section PR1 Prescription

King George Timber Sale Unit Number 9 In Alternative 1,3, 4, 5

Compartment 156 VCU 462 Total Acres 76 Harvest Acres 76
Harvest method helicopter Volume Harvested 894 MBF

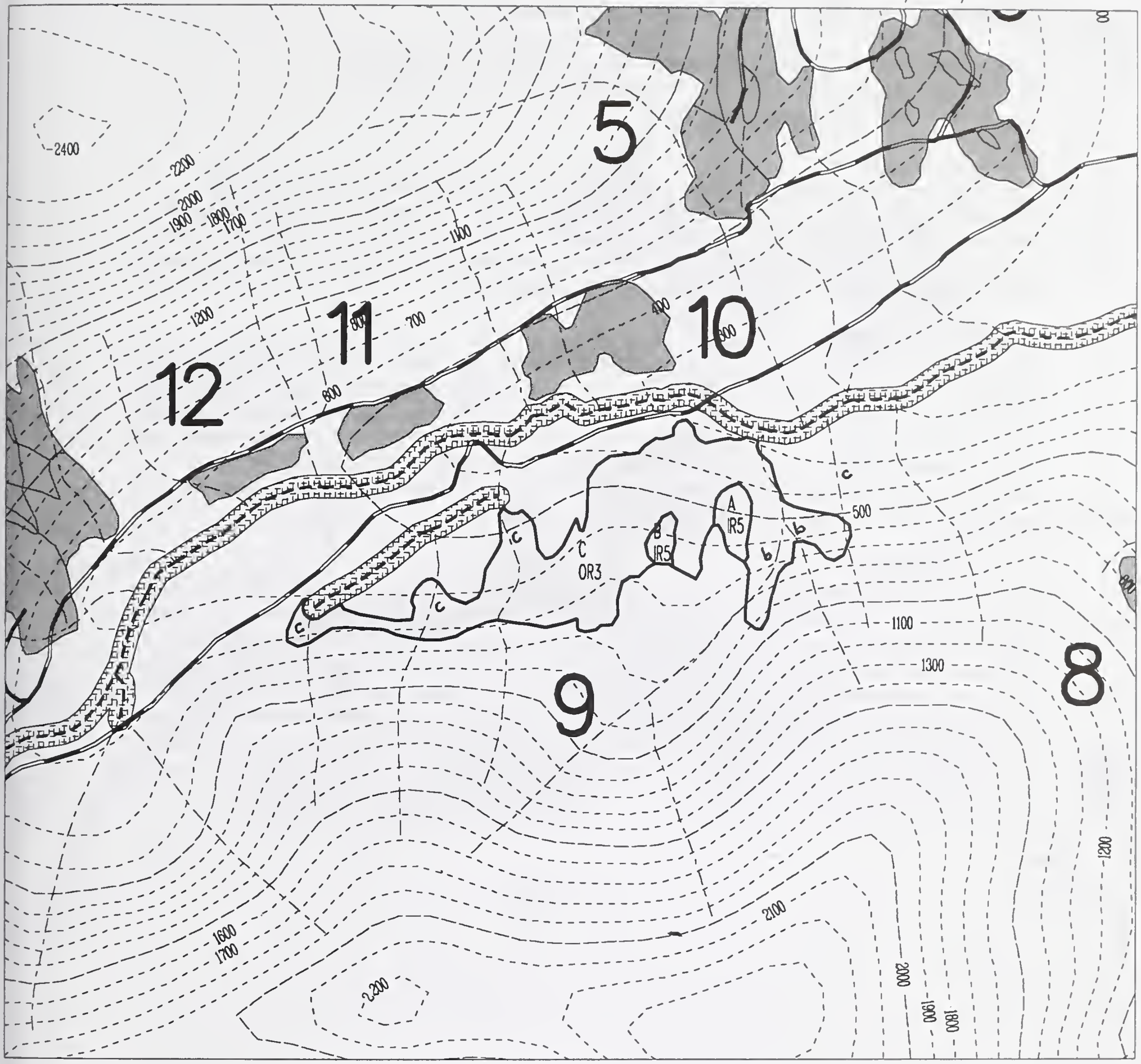
EXISTING CONDITION:
The unit is located in the Honeymoon land unit and is visible Zimovia highway. There is extensive porcupine activity and bole rot within the western hemlock. There is cedar decline present in the western part of this stand. There are 24 acres of forested wetlands within this unit. The southern boundary of this unit borders a high hazard soil unit and one acre is included within the unit. This unit contains six class III streams which are tributary to class II habitat. Streams fan out along toe slopes, particularly on the east side of this unit. Stream stability is dependent on large down wood.

DESIRED CONDITION:
The desired condition of this unit is to harvest timber over a 150 year rotation and meet partial retention. Harvest will maintain a moderate amount of retention through the unit, which will reduce fragmentation. Maintain stilted root trees of any species, snags, trees with large branches (greater than 3") for nesting platforms and large diameter trees with heart rot for cavity nesting birds. Harvest activity will mimic natural vegetative patterns such as blowdown or disease pockets. Maintain large wood supply in alluvial fans tributary to resident fish habitat. Minimize sediment transport to Honeymoon Creek.

PRESCRIPTION DIRECTION:
The objectives of this unit can best be met by two-aged management. The unit is divided into several sections in order to implement harvest prescriptions in the following manner. Sections A and B will be harvested by individual tree selection which will retain 50% of the basal area over these sections. Section C will be harvested by overstory removal while retaining 30 % of the basal area. Retention should be as windfirm as possible, particularly along streams. Regeneration of harvested areas will be naturally seeded by adjacent trees and seed trees. Future stand treatments may involve limited thinning or sanitation to favor spruce, or cedar and growth of trees with good form for timber. These treatments will also seek to maintain 10-15% of the trees as future snags and large trees for structural diversity. In order to achieve this, some areas within the unit may be left untreated. Harvesting this unit by helicopter and retaining 30- 50 % of the basal area through the unit is expected to have minor effects to the forested wetland acres within this unit. Maintain 100' buffer along class II streams. Take particular care not to disturb existing downwood on 'b' streams. Helicopter yarding is needed to meet this objective. Protection of streams is shown on unit map.

UNIT 9

Alternatives 1, 3, 4 & 5



Proposed Roads

Class 1 Streams

Class 2 Streams

Class 3 Streams

★ Eagle Nest Tree

E Proposed Log Transfer Facility

Proposed cut units

Adjacent proposed units

Saltwater and Lakes

TTRA Buffers

Scale: 4 inches = 1 mile

A Section
PR1 Prescription

King George Timber Sale Unit Number 10 In Alternative 1, 4, 5

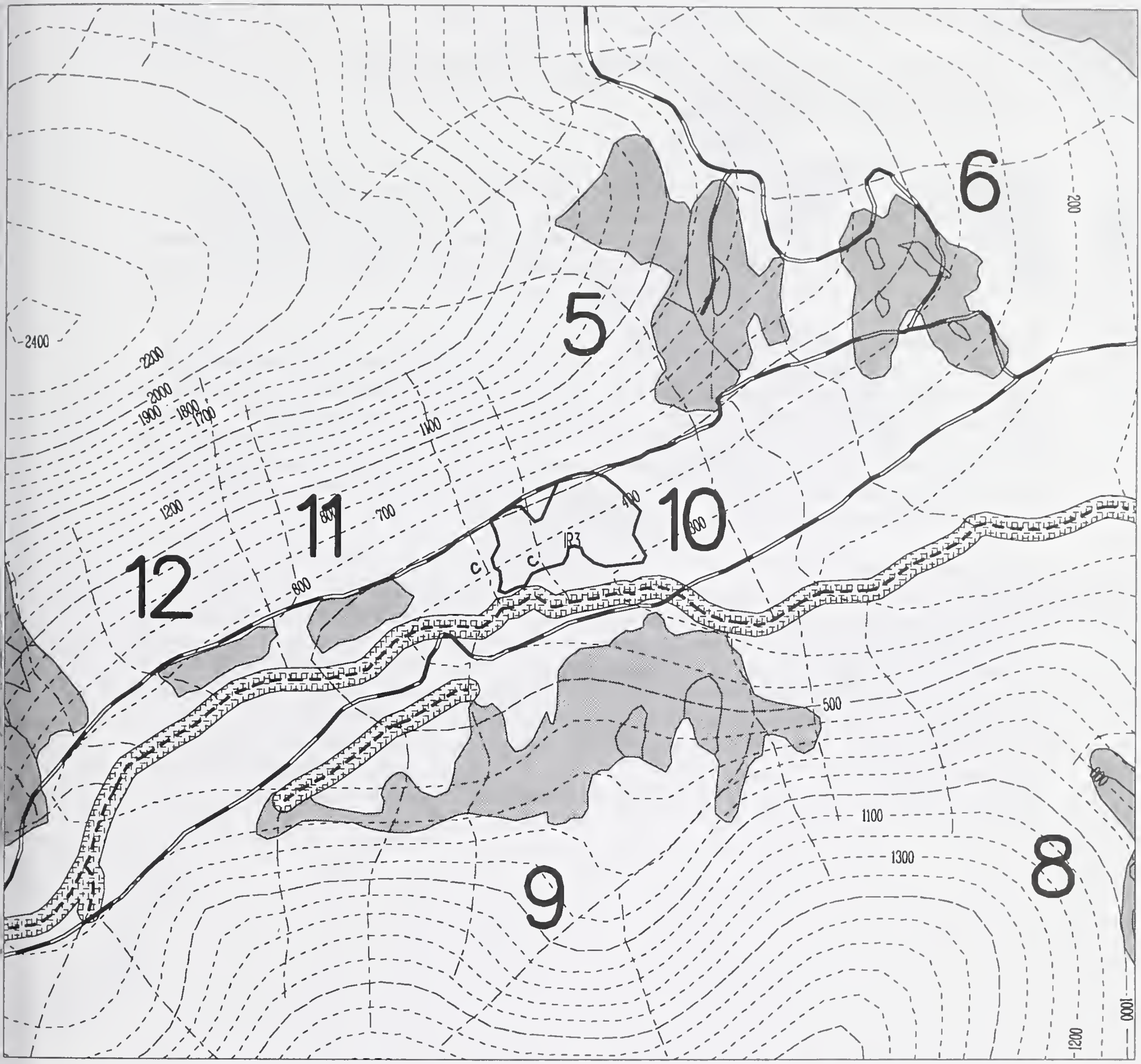
Compartment 156 VCU 462 Total Acres 19 or 16 Harvest Acres 19 or 16
Harvest method cable or helicopter Volume Harvested by cable 773 MBF
Volume Harvested by helicopter 564 MBF

EXISTING CONDITION:
The unit is located in the Honeymoon land unit and is visible Zimovia highway. There is extensive porcupine activity and bole rot within the western hemlock. The unit is located within high deer winter range and high brown creeper and marten habitat. This unit is heavily populated by red squirrels, moose and elk. This unit is contained within a travel corridor for large mammals. There are two class III streams in the western portion of this unit which are tributary to class II streams.

DESIRED CONDITION:
The desired condition of this unit is to harvest timber over a 300 year rotation and meet partial retention. This unit will be managed to produce high quality Sitka spruce lumber and other timber products. Harvest will maintain a moderate amount of retention through the unit, which will reduce fragmentation. Maintain stilted root trees of any species, snags, trees with large branches (greater than 3”) for nesting platforms and large diameter trees with heart rot for cavity nesting birds. Harvest activity will mimic natural vegetative patterns such as blowdown or disease pockets. Minimize sediment transport to downstream fish habitat. Maintain a large wood supply to stream channels over the rotation.

PRESCRIPTION DIRECTION:
The objectives of this unit can best be met by two-aged or uneven-aged management. If the unit is harvested by helicopter, it will retain 50 % of the basal area. If the unit is harvested by cable, it will leave 30 % of the basal area as retention. Retention should be as windfirm as possible, particularly adjacent to streams and stream buffers. Regeneration of harvested areas will be naturally seeded by adjacent trees and seed trees. If a adequate stocking is not achieved by natural regeneration, then Sitka spruce will be planted. Future stand treatments may involve limited thinning, pruning or sanitation to favor spruce and growth of trees with good form for timber. These treatments will also seek to maintain 10-15% of the trees as future snags and large trees for structural diversity. Place a standard 100’ buffer along Honeymoon Creek and it’s class II tributaries. Class III streams will be protected by streamcourse protection clause ‘c’.

UNIT 10 Alternatives 4 & 5



Proposed Roads

Class 1 Streams

Class 2 Streams

Class 3 Streams

★ Eagle Nest Tree

E Proposed Log Transfer Facility

Proposed cut units

Adjacent proposed units

Saltwater and Lakes

TTRA Buffers

Scale: 4 inches = 1 mile

A Section
PR1 Prescription

King George Timber Sale Unit Number 10 In Alternative 1, 4, 5

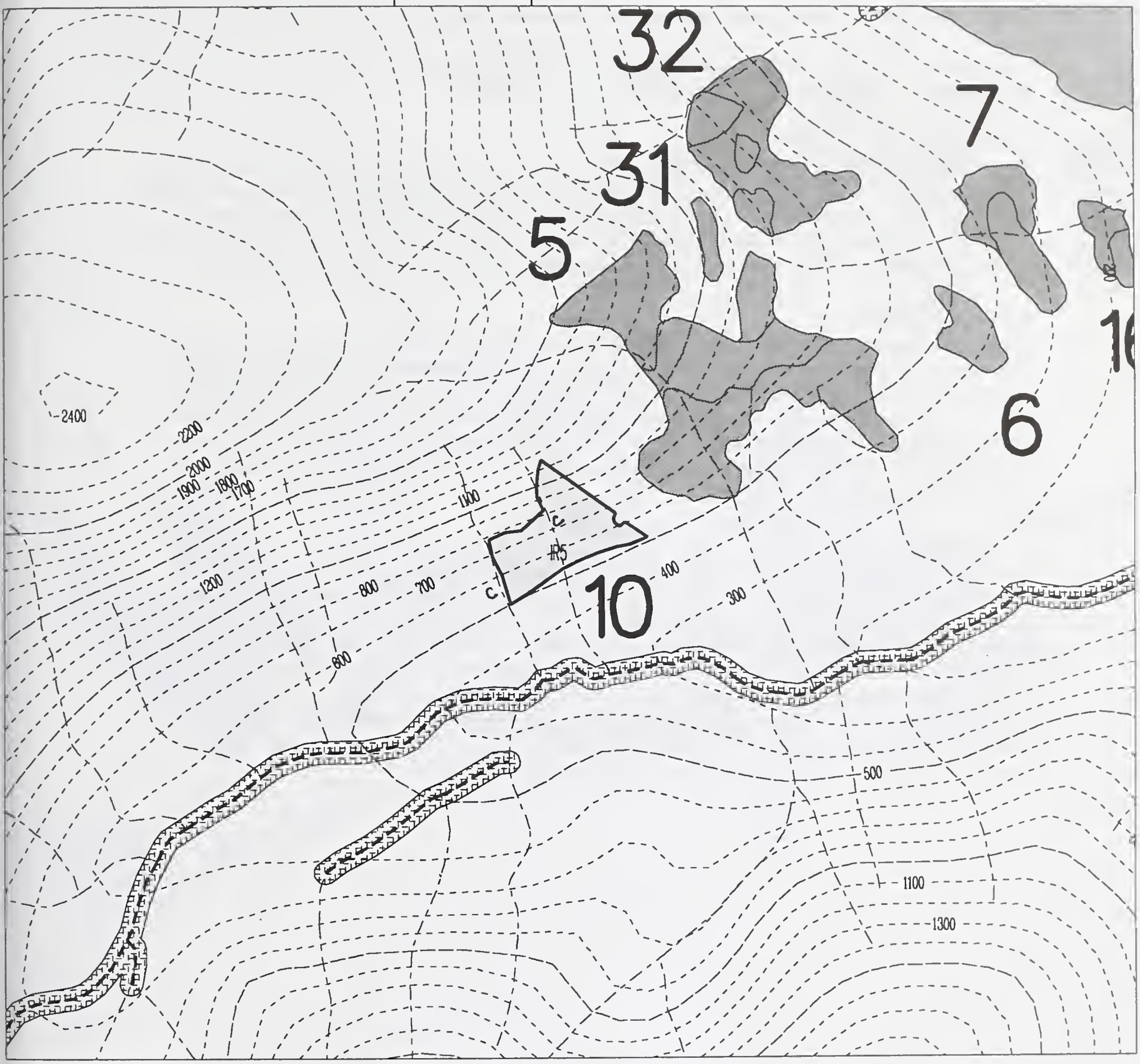
Compartment 156 VCU 462 Total Acres 19 or 16 Harvest Acres 19 or 16
Harvest method cable or helicopter Volume Harvested by cable 773 MBF
Volume Harvested by helicopter 564 MBF

EXISTING CONDITION:
The unit is located in the Honeymoon land unit and is visible Zimovia highway. There is extensive porcupine activity and bole rot within the western hemlock. The unit is located within high deer winter range and high brown creeper and marten habitat. This unit is heavily populated by red squirrels, moose and elk. This unit is contained within a travel corridor for large mammals. There are two class III streams in the western portion of this unit which are tributary to class II streams.

DESIRED CONDITION:
The desired condition of this unit is to harvest timber over a 300 year rotation and meet partial retention. This unit will be managed to produce high quality Sitka spruce lumber and other timber products. Harvest will maintain a moderate amount of retention through the unit, which will reduce fragmentation. Maintain stilted root trees of any species, snags, trees with large branches (greater than 3") for nesting platforms and large diameter trees with heart rot for cavity nesting birds. Harvest activity will mimic natural vegetative patterns such as blowdown or disease pockets. Minimize sediment transport to downstream fish habitat. Maintain a large wood supply to stream channels over the rotation.

PRESCRIPTION DIRECTION:
The objectives of this unit can best be met by two-aged or uneven-aged management. If the unit is harvested by helicopter, it will retain 50 % of the basal area. If the unit is harvested by cable, it will leave 30 % of the basal area as retention. Retention should be as windfirm as possible, particularly adjacent to streams and stream buffers. Regeneration of harvested areas will be naturally seeded by adjacent trees and seed trees. If a adequate stocking is not achieved by natural regeneration, then Sitka spruce will be planted. Future stand treatments may involve limited thinning, pruning or sanitation to favor spruce and growth of trees with good form for timber. These treatments will also seek to maintain 10-15% of the trees as future snags and large trees for structural diversity. Place a standard 100' buffer along Honeymoon Creek and it's class II tributaries. Class III streams will be protected by streamcourse protection clause 'c'.

UNIT 10 - Helicopter Option - Alternative 1



Proposed Roads
Class 1 Streams
Class 2 Streams
Class 3 Streams
Eagle Nest Tree
E Proposed Log Transfer Facility
Proposed cut prescriptions
Adjacent proposed units
Saltwater and Lakes
TTRA Buffers
Scale/ 4 inches = 1 mile
A Section
PR1 Prescription

King George Timber Sale Unit Number 11 In Alternative 3, 4, 5

Compartment 156 VCU 462 Total Acres 7 Harvest Acres 7
Harvest method cable or shovel Volume Harvested 316 MBF

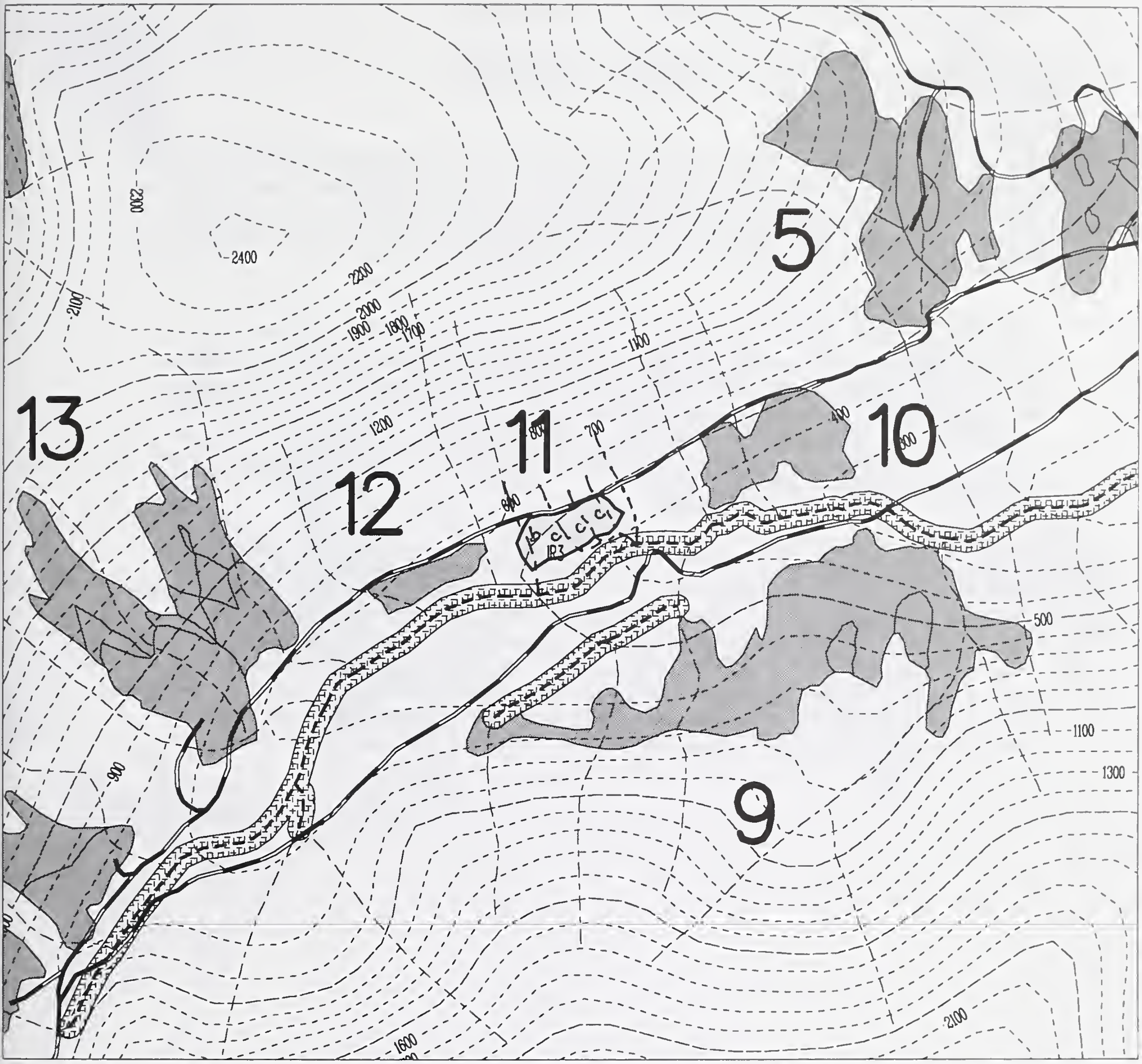
EXISTING CONDITION:
The unit is located in the Honeymoon land unit. There is extensive porcupine activity and bole rot within the western hemlock. The unit is located within high deer winter range and high brown creeper and marten habitat. This unit is heavily populated by red squirrels, moose and elk. This unit is located in a travel corridor for large mammals. There are four small class III streams in this unit which are tributary to class II fish habitat. The western most stream was recently scoured by a debris flow above the proposed road.

DESIRED CONDITION:
The desired condition of this unit is to harvest timber over a 300 year rotation and meet partial retention. This unit will be managed to produce high quality Sitka spruce for lumber and other timber products. Harvest will maintain a moderate amount of retention through the unit, which will reduce fragmentation. Maintain stilted root trees of any species, snags, trees with large branches (greater than 3") for nesting platforms and large diameter trees with heart rot for cavity nesting birds. Harvest activity will mimic natural vegetative patterns such as blowdown or disease pockets. Minimize sediment transport into Honeymoon Creek and it's tributaries.

PRESCRIPTION DIRECTION:
The objectives of this unit can best be met by two-aged or uneven-aged management. The unit will be harvested by individual tree selection which will leave 30 % of the basal area as retention. Retention should be as windfirm as possible, particularly adjacent to streams. Regeneration of harvested areas will be naturally seeded by adjacent trees and seed trees. If a adequate stocking is not achieved by natural regeneration then Sitka spruce will be planted. Future stand treatments may involve limited thinning, pruning or sanitation to favor spruce and growth of trees with good form for timber. These treatments will also seek to maintain 10-15% of the trees as future snags and large trees for structural diversity. Place a standard 100' buffer along Honeymoon Creek and class II tributaries. Protection of streams is shown of unit map. Utilize full suspension on all class III streams within this unit.

UNIT 11

Alternatives 3, 4 & 5



Proposed Roads

Class 1 Streams

Class 2 Streams

Class 3 Streams

★ Eagle Nest Tree

E Proposed Log Transfer Facility

Proposed cut units

Adjacent proposed units

Saltwater and Lakes

TTRA Buffers

Scale: 4 inches = 1 mile

A Section
PR1 Prescription

King George Timber Sale Unit Number 12 In Alternative 3, 4, 5

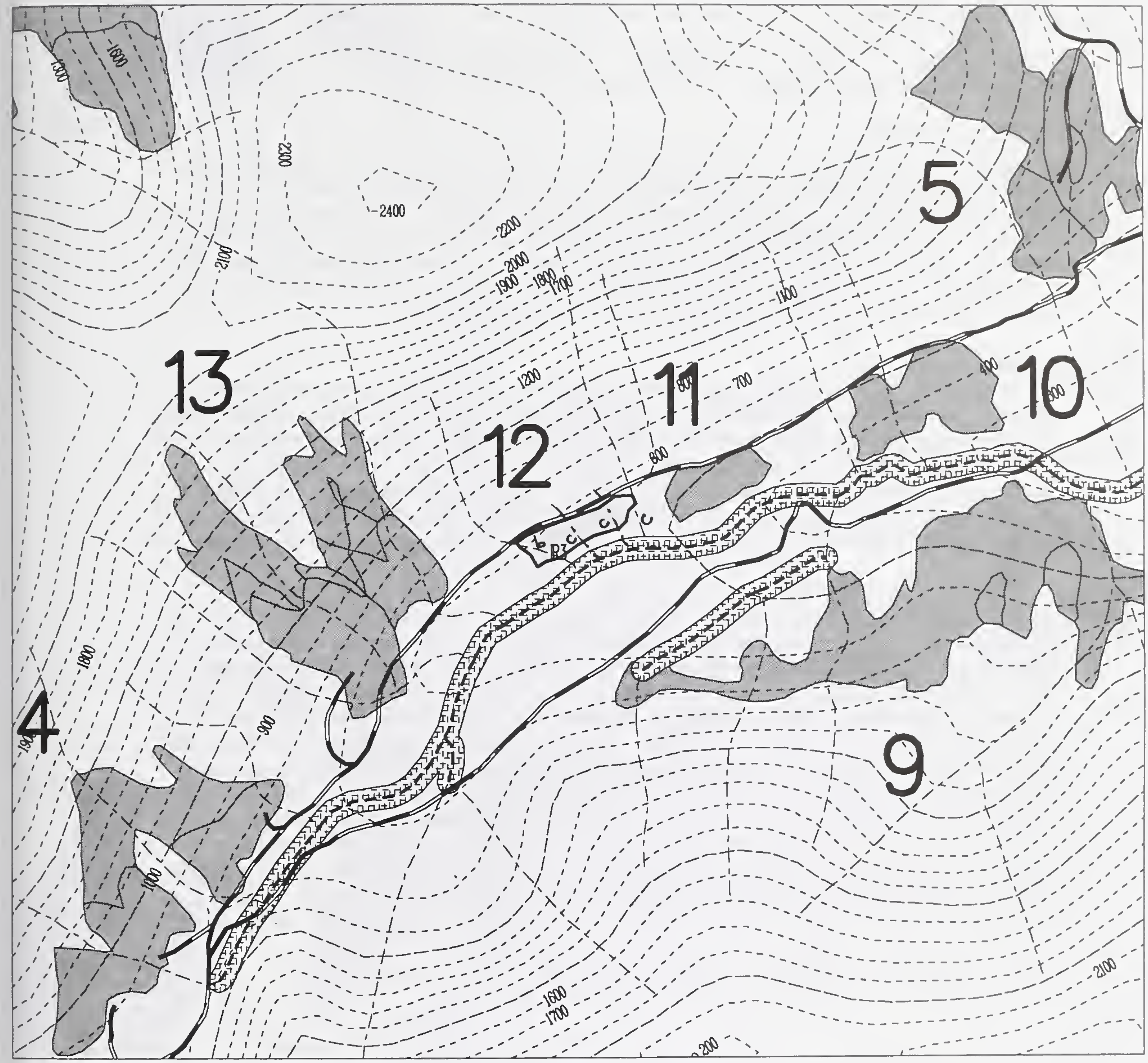
Compartment 156 VCU 462 Total Acres 6 Harvest Acres 6
Harvest method cable or shovel Volume Harvested 167 MBF

EXISTING CONDITION:
The unit is located in the Honeymoon land unit. There is extensive porcupine activity and bole rot within the western hemlock. The unit is located within high deer winter range and high brown creeper and marten habitat. This unit is heavily populated by red squirrels, moose and elk. This unit is located in a travel corridor for large mammals. There are four small class III streams in this unit which are tributary to class II fish habitat.

DESIRED CONDITION:
The desired condition of this unit is to harvest timber over a 300 year rotation and meet partial retention. This unit will be managed to produce high quality Sitka spruce for lumber and other timber products. Harvest will maintain a moderate amount of retention through the unit, which will reduce fragmentation. Maintain stilted root trees of any species, snags, trees with large branches (greater than 3") for nesting platforms and large diameter trees with heart rot for cavity nesting birds. Harvest activity will mimic natural vegetative patterns such as blowdown or disease pockets. Minimize sediment transport to Honeymoon Creek and it's tributaries.

PRESCRIPTION DIRECTION:
The objectives of this unit can best be met by two-aged or uneven-aged management. The unit will be harvested by individual tree selection and retaining 30 % of the basal area. Retention should be as windfirm as possible, particularly adjacent to streams. Regeneration of harvested areas will be naturally seeded by adjacent trees and seed trees. If a adequate stocking is not achieved by natural regeneration, then Sitka spruce will be planted. Future stand treatments may involve limited thinning, pruning or sanitation to favor spruce and growth of trees with good form for timber. These treatments will also seek to maintain 5-10% of the trees as future snags and large trees for structural diversity. Place a standard 100' buffer along Honeymoon Creek and class II tributaries within the unit. Protection of streams is shown on unit maps.

UNIT 12 Alternatives 3, 4 & 5



Proposed Roads

Class 1 Streams

Class 2 Streams

Class 3 Streams

★ Eagle Nest Tree

E Proposed Log Transfer Facility

Proposed cut units

Adjacent proposed units

Saltwater and Lakes

TTRA Buffers

Scale: 4 inches = 1 mile

A Section
PR1 Prescription

King George Timber Sale Unit Number 13 In Alternative 2, 3, 4, 5

Compartment 156 VCU 462 Total Acres 66 Harvest Acres 57
Harvest method cable & helicopter Volume Harvested 1511 MBF

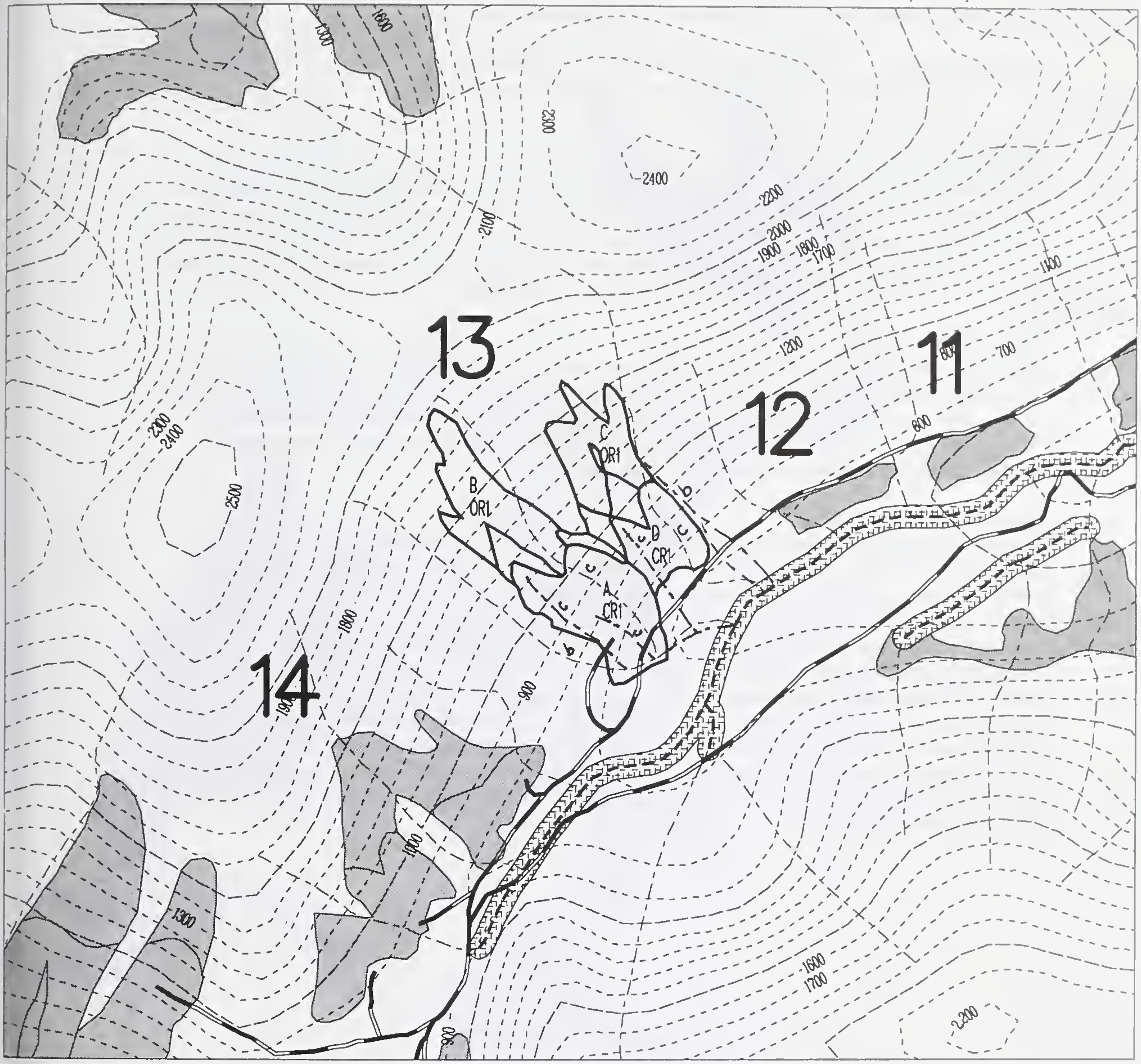
EXISTING CONDITION:
The unit is visible from Zimovia Strait and Bessie Peak. The unit is located in the Honeymoon land unit. There are seven class III streams which are tributary to class II fish habitat within this unit. There is extensive porcupine activity and bole rot within the western hemlock. This unit contains about 52 acres of soil types with moderately high hazard stability rating. This unit also contains 1 acre of mapped forested wetlands located in the southern portion of the unit along the stream. A quarter of this unit is located in high marten, red squirrel and brown creeper habitat and half the unit is located in high deer winter range habitat. The lower portion of this unit contains fairly stable small alluvial fans.

DESIRED CONDITION:
The desired condition of this unit is to harvest timber over a 150 year rotation and meet partial retention. Harvest will maintain a light to moderate amount of retention through the unit, which will minimize visual impacts. Harvest activity will mimic the natural vegetative patterns of a landslide or alpine meadow. Maintain stilted root trees of any species, snags, trees with large branches (greater than 3") for nesting platforms and large diameter trees with heart rot for cavity nesting birds. Design the unit up and down the slope to maintain elevational corridor from Honeymoon Creek to the alpine within the landscape. Maintain channel stability through footslope, alluvial fan areas. Minimize sediment transport into Honeymoon Creek.

PRESCRIPTION DIRECTION:
The objectives of this unit can best be met by two-aged management. The unit is divided into several sections in order to implement harvest prescriptions in the following manner. Sections A & D will be harvested by cable, while using individual tree selection and retaining 10% of the basal area over these sections. Sections B & C will be harvested by helicopter using individual tree selection and retaining 10% of the basal area within these sections. There will be unharvested triangular islands within this unit in order to enhance the appearance of the unit as a landslide. Retention will include seedtrees of yellow-cedar and Sitka spruce whenever possible. Retention should be as windfirm as possible, particularly along streams. Full suspension and retention of windfirm trees will be used to reduce the risk of slope failure. Regeneration of the unit will be natural seeding by adjacent trees and seed trees. Future stand treatments may involve limited thinning or sanitation to favor spruce, cedar and growth of trees with good form for timber. These treatments will also seek to maintain 10-15% of the trees as future snags and large trees for structural diversity. In order to achieve this, some areas within the unit may be left untreated. Leave existing down material in place on 'b' protect streams. Protection of streams is shown on unit maps.

NOTE: Alternative 4 only harvests the western part of this unit (sections A & B).

UNIT 13 Alternatives 2, 3, 4 & 5



Proposed Roads

Class 1 Streams

Class 2 Streams

Class 3 Streams

★ Eagle Nest Tree

E Proposed Log Transfer Facility

Proposed cut units

Adjacent proposed units

Saltwater and Lakes

TTRA Buffers

Scale: 4 inches = 1 mile

A Section
PR1 Prescription

King George Timber Sale Unit Number 14 In Alternative 2, 3, 4, 5

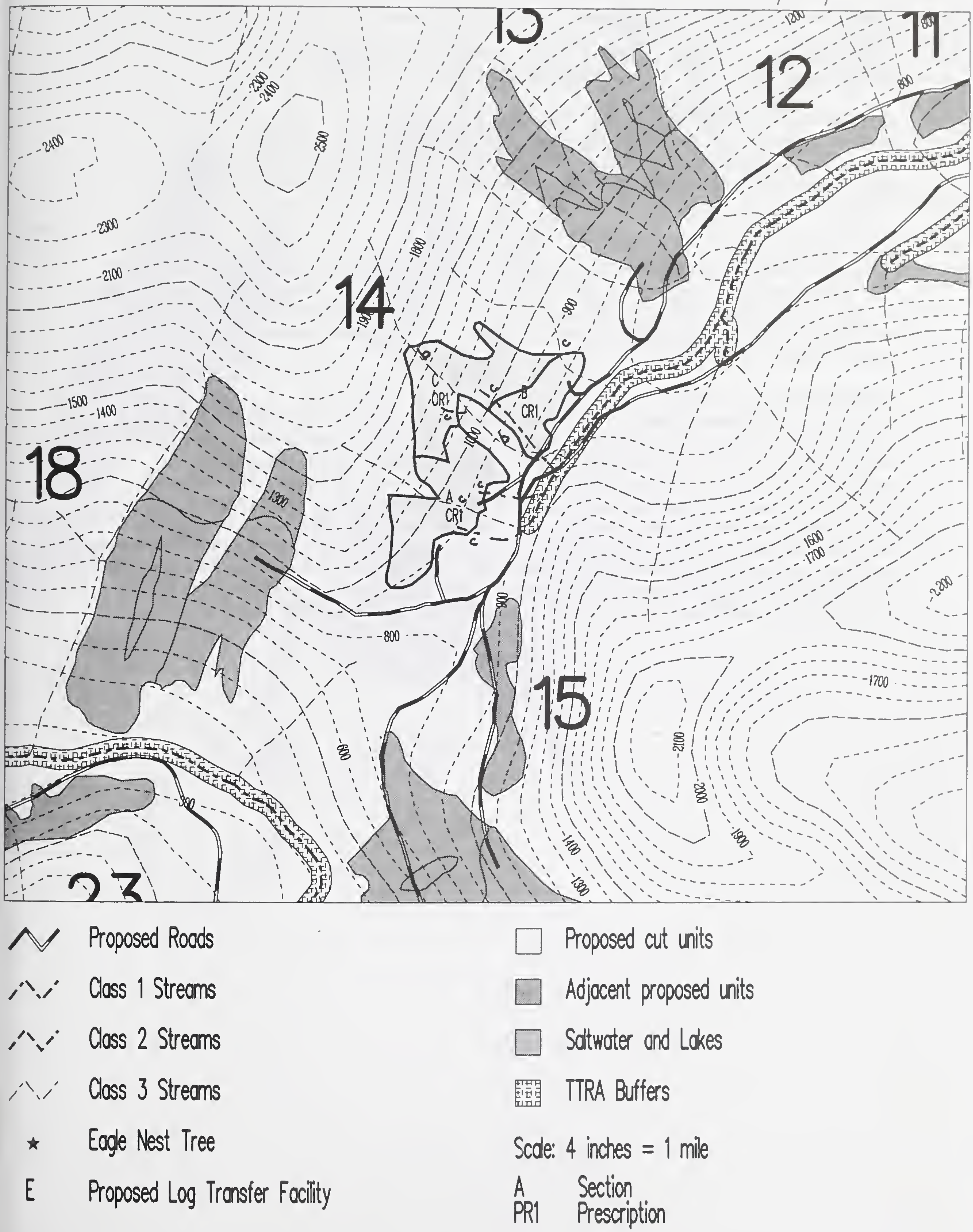
Compartment 156 VCU 462 Total Acres 55 Harvest Acres 55
Harvest method cable & helicopter Volume Harvested 1369 MBF

EXISTING CONDITION:
The unit is seen obliquely from Zimovia Strait and Zimovia Highway. The unit is located in the Honeymoon land unit. There are five class III streams within this unit which are tributary to class II fish habitat. There is extensive porcupine activity and bole rot within the western hemlock. This unit contains about 12 acres of soil types with moderately high hazard stability rating. This unit also contains 20 acres of mapped forested wetlands. The lower portion of this unit is a travel corridor for black bear, deer, elk and moose. About 1/4 of this unit is located in high brown creeper habitat.

DESIRED CONDITION:
The desired condition of this unit is to harvest timber over a 150 year rotation and meet partial retention. After harvest there will be a light amount of retention through the unit. Maintain stilted root trees of any species, snags, trees with large branches (greater than 3") for nesting platforms and large diameter trees with heart rot for cavity nesting birds. Harvest activity will mimic the natural vegetative pattern of a landslide. Minimize sediment transport into Honeymoon Creek.

PRESCRIPTION DIRECTION:
The objectives of this unit can best be met by two-aged management. The unit is divided into several sections in order to implement harvest prescriptions in the following manner. Sections A & B will be harvested by cable, while using individual tree selection and retaining 10% of the basal area over these sections. Section C will be harvested by helicopter using individual tree selection and retaining 10% of the basal area. Full suspension and retaining windfirm trees will reduce the risk of slope failure. Retention will include seedtrees of yellow-cedar and Sitka spruce whenever possible. Retention should be as windfirm as possible, particularly adjacent to streams. Regeneration of the unit will be natural seeding by adjacent trees and seed trees. Future stand treatments may involve limited thinning or sanitation to favor spruce, cedar and growth of trees with good form for timber. These treatments will also seek to maintain 5-10% of the trees as future snags and large trees for structural diversity. Place a 100' buffer along Honeymoon Creek and it's class II tributaries. Remove windthrow prone trees from exclusion on 'b' protect stream. Protect streams as shown on unit map.

UNIT 14 Alternatives 2, 3, 4 & 5



King George Timber Sale Unit Number 15 In Alternative 2, 3, 4, 5

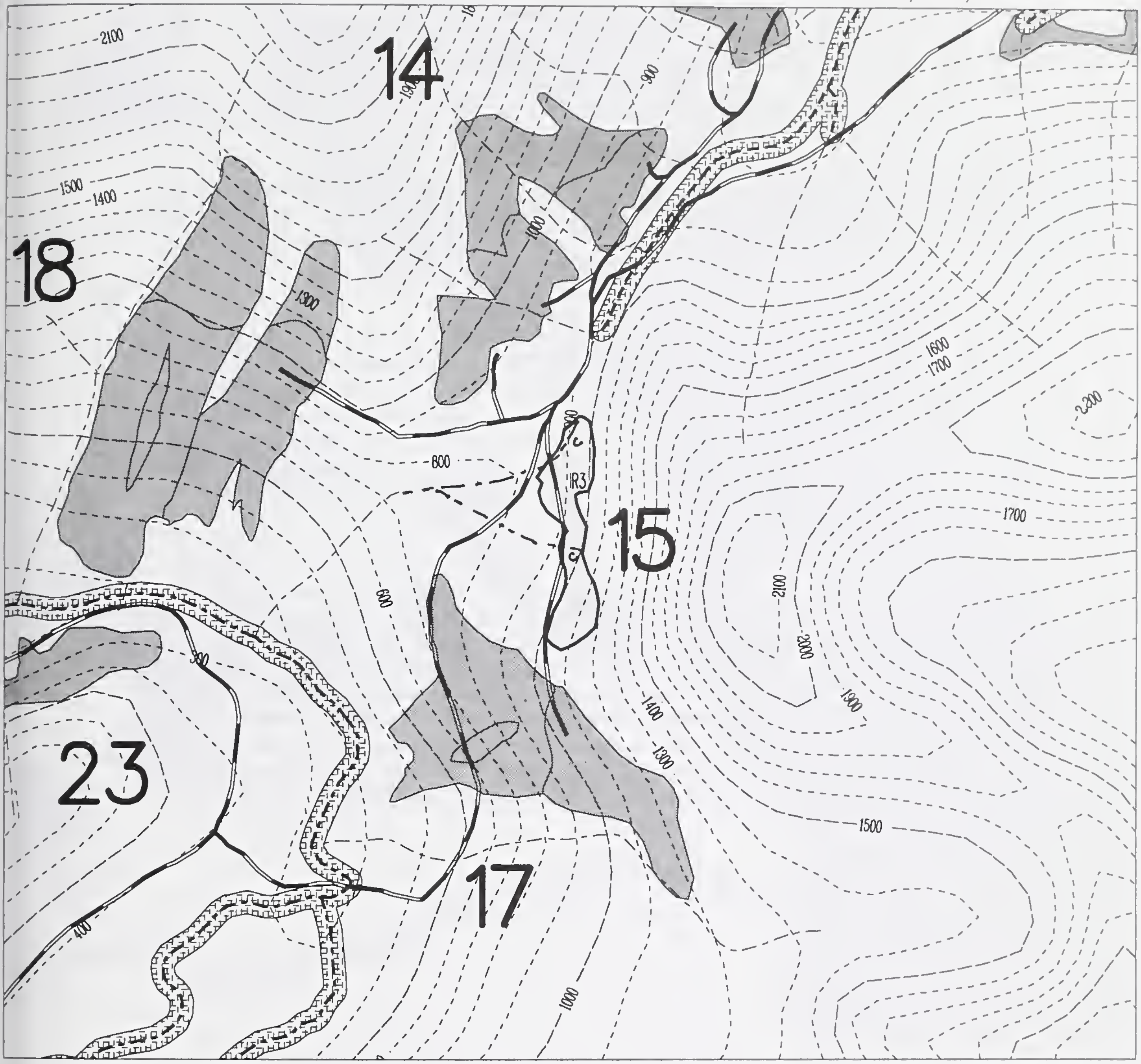
Compartment 156 VCU 462 Total Acres 14 Harvest Acres 14
Harvest method cable Volume Harvested 263 MBF

EXISTING CONDITION:
The unit is visible as background from King George estuary and the Alaska Marine Highway. The is located in the Honeymoon land unit. Two class III streams flow through this unit. There is extensive porcupine activity and bole rot within the western hemlock. There is an avalanche shoot (brush field) east of this unit.

DESIRED CONDITION:
The desired condition of this unit is to harvest timber over a 150 year rotation and meet partial retention. After harvest there will be a moderate amount of retention through the unit. Maintain stilted root trees of any species, snags, trees with large branches (greater than 3") for nesting platforms and large diameter trees with heart rot for cavity nesting birds. Prevent the increase in size of the avalanche shoot. Minimize sediment transport to King George Creek.

PRESCRIPTION DIRECTION:
The objectives of this unit can best be met by two-aged management. This unit will be harvested by cable to protect the soil resource. Utilize individual tree selection and retain 30% of the basal area. Retention will include seedtrees of yellow-cedar and Sitka spruce whenever possible. Retention should be as windfirm as possible, particularly along streams. The boundary of this unit will be below the high hazard soils to the east and a buffer along this eastern boundary will help prevent the increase in the size of the brush field above the unit. Regeneration of the unit will be natural seeding by adjacent trees and seed trees. Future stand treatments may involve limited thinning or sanitation to favor spruce, cedar and growth of trees with good form for timber. These treatments will also seek to maintain 5-10% of the trees as future snags and large trees for structural diversity. Close the temporary road into this unit to motorized vehicles after harvest to protect wildlife corridor values to Kunk Lake area. Protect streams as shown on the unit map.

UNIT 15 Alternatives 2, 3, 4 & 5



Proposed Roads	Proposed cut units
Class 1 Streams	Adjacent proposed units
Class 2 Streams	Saltwater and Lakes
Class 3 Streams	TTRA Buffers
★ Eagle Nest Tree	Scale: 4 inches = 1 mile
E Proposed Log Transfer Facility	A Section PR1 Prescription

King George Timber Sale Unit Number 16 In Alternative 1

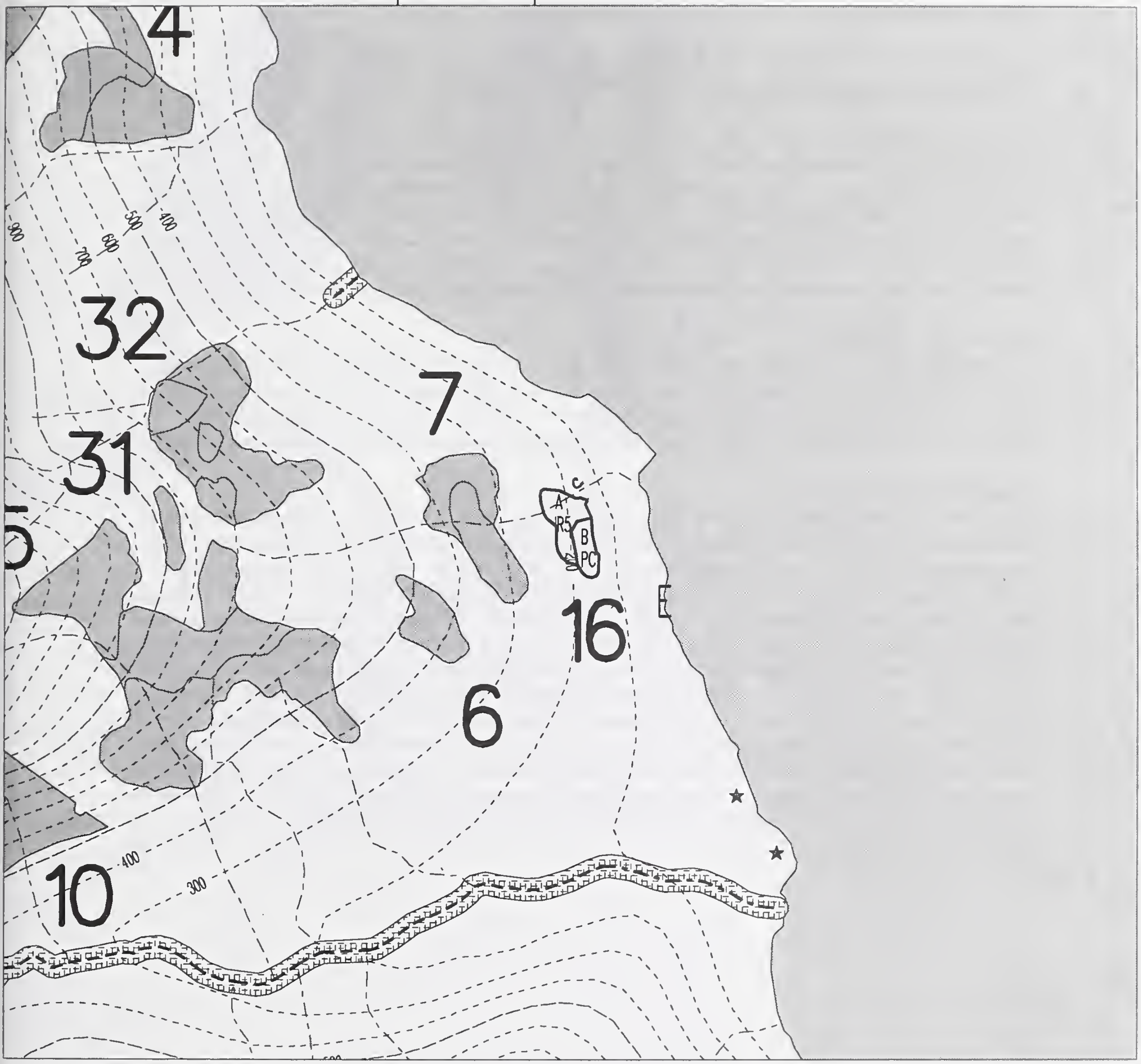
Compartment 156 VCU 462 Total Acres 6 Harvest Acres 6
Harvest method helicopter Volume Harvested 108 MBF

EXISTING CONDITION:
This unit is located in the Honeymoon land unit and is visible from Zimovia Strait and Zimovia highway. There is one class III stream within this unit. There is extensive porcupine activity and bole rot within the western hemlock. This unit is located within high quality deer, black bear, marten, elk and brown creeper habitat.

DESIRED CONDITION:
The desired condition of this unit is to harvest timber over a 100 year rotation and meet partial retention. Harvest will maintain a moderate amount of retention through the north western portion of the unit and a slight amount of retention in the south eastern portion. Maintain stilted root trees of any species, snags, trees with large branches (greater than 3") for nesting platforms and large diameter trees with heart rot for cavity nesting birds. Harvest activity will mimic natural vegetative patterns such as blowdown or disease pockets. Recreational and ferry/cruise ship passengers may notice harvest, but it should appear as a natural disturbance dispersed over the landscape. This unit will help reduce some of the visual impact of the backline in the existing harvest unit.

PRESCRIPTION DIRECTION:
The objectives of this unit can best be met by two-aged management. The unit is divided into two sections in order to implement harvest prescriptions in the following manner. Sections A will be harvested by individual tree selection which will retain 50% of the basal area over this section. Section B will be harvested by seedtree method. This unit will be perceived as a gradual change over time from travel routes. Retention should be as windfirm as possible, particularly adjacent to the stream. Regeneration of harvested areas will be naturally seeded by adjacent trees and seed trees from within the unit. Future stand treatments may involve limited thinning or sanitation to favor spruce, cedar and growth of trees with good form for timber. These treatments will seek to maintain 5-10% of the trees as future snags and large trees for structural diversity. Streamcourse protection clause 'c' will be applied to the stream in this unit.

UNIT 16 - Helicopter Option - Alternative 1



	Proposed Roads		Proposed cut prescriptions
	Class 1 Streams		Adjacent proposed units
	Class 2 Streams		Saltwater and Lakes
	Class 3 Streams		TTRA Buffers
★	Eagle Nest Tree		Scale/ 4 inches = 1 mile
E	Proposed Log Transfer Facility	A	Section
		PR1	Prescription

King George Timber Sale Unit Number 17 In Alternative 2, 3, 5

Compartment 156 VCU 462 Total Acres 60 Harvest Acres 58
Harvest method cable & helicopter Volume Harvested 1632 MBF

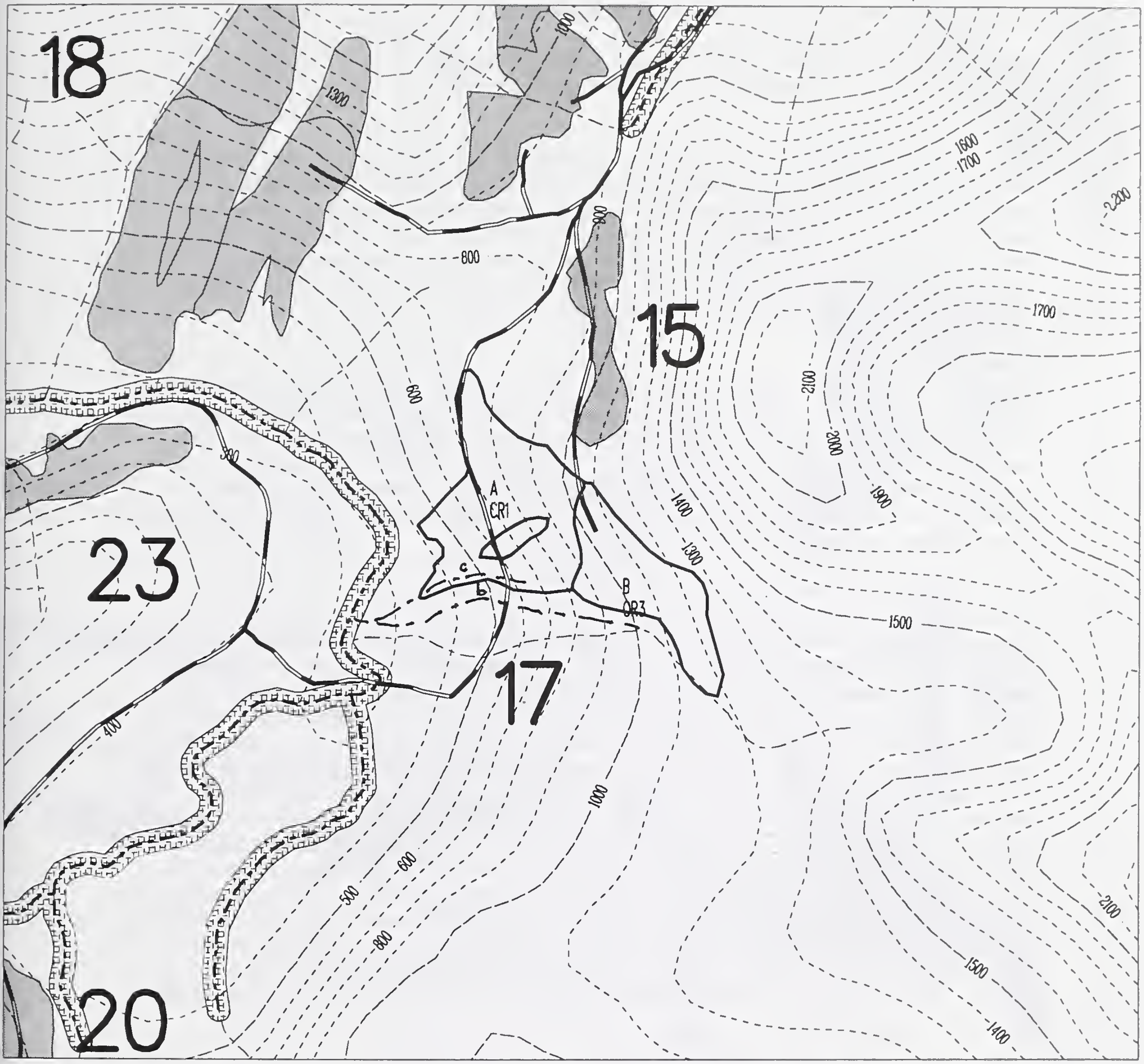
EXISTING CONDITION:
The unit is visible as background from King George estuary and the Alaska Marine Highway. This unit is located in the Honeymoon land unit. There are two class III streams within and bordering this unit which are tributary to class I fish habitat. There is extensive windthrow, porcupine activity and bole rot within the western hemlock. The unit is located within high deer winter range habitat and high quality brown creeper and marten habitat. This unit also contains 17 acres of mapped forested wetlands. There is an alluvial fan - floodplain complex outside the southwest unit boundary, containing several class I and II tributaries.

DESIRED CONDITION:
The desired condition of this unit is to harvest timber over a 150 year rotation and meet partial retention. After harvest there will be a light to moderate amount of retention through the unit. Maintain stilted root trees of any species, snags, trees with large branches (greater than 3") for nesting platforms and large diameter trees with heart rot for cavity nesting birds. Minimize sediment transport to King George Creek.

PRESCRIPTION DIRECTION:
The objectives of this unit can best be met by two-aged management. The unit is divided into two sections in order to implement harvest prescriptions in the following manner. Section A will be harvested by cable, while using individual tree selection and retaining 10% of the basal area. Section B will be harvested by helicopter using overstory removal and retaining 30% of the basal area within this section. There will be an island of unharvested timber in section A and the unit boundary will be feathered to enhance appearance by providing texture. The overstory removal in section B should help feather the unit and make it blend better into the horizontal landscape. Retention will include seedtrees of yellow-cedar and Sitka spruce whenever possible. Retention should be as windfirm as possible. Regeneration of the unit will be natural seeding by adjacent trees and seed trees. Future stand treatments may involve limited thinning or sanitation to favor spruce, cedar and growth of trees with good form for timber. These treatments will also seek to maintain 5-10% of the trees as future snags and large trees for structural diversity. Maintain 100' buffer between unit boundary and class I or II streams. Remove windthrow prone trees near and upstream for the road along the 'b' protect stream that is south of this unit. Exclude alluvial fan and floodplain landforms from unit. Protect streams as shown on unit map.

UNIT 17

Alternatives 2, 3 & 5



Proposed Roads

Class 1 Streams

Class 2 Streams

Class 3 Streams

Eagle Nest Tree

E Proposed Log Transfer Facility

Proposed cut units

Adjacent proposed units

Saltwater and Lakes

TTRA Buffers

Scale: 4 inches = 1 mile

A Section

PR1 Prescription

King George Timber Sale Unit Number 18 In Alternative 2, 5

Compartment 156 VCU 462 Total Acres 101 Harvest Acres 98
Harvest method cable & helicopter Volume Harvested 2542 MBF

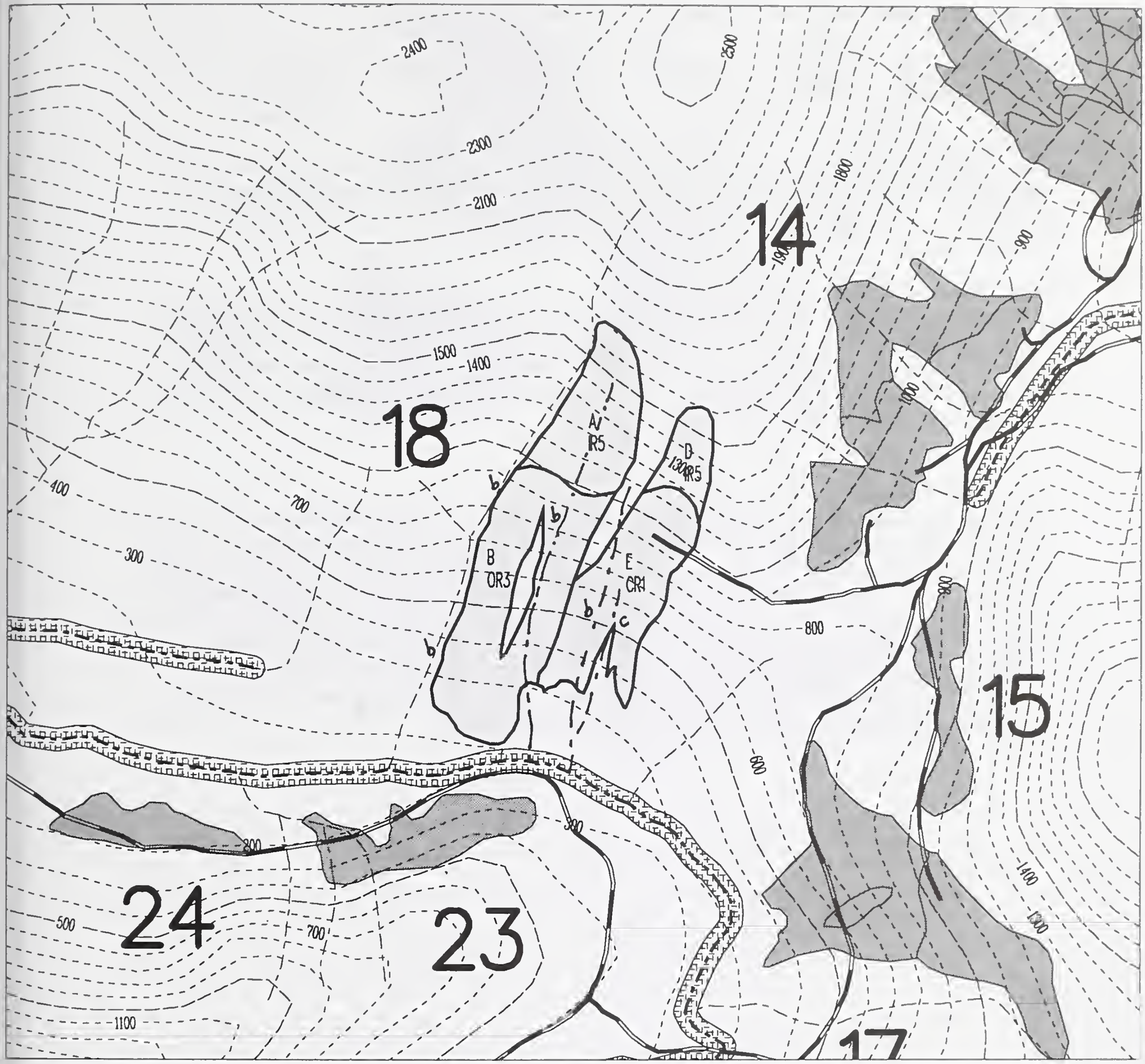
EXISTING CONDITION:
The unit is seen obliquely from King George estuary and from Bessie Peak, and is located in the King George land unit. There are class III streams which are tributary to class I habitat within and bordering this unit. The class III stream that is along the western unit boundary is very large and deep. There is extensive porcupine activity and bole rot within the western hemlock. The unit is located within high deer winter range habitat and high quality brown creeper, goshawk and marten habitat. The upper slopes have somewhat poorly drained soils underlain by basal till. The risk of mass movement for these soil types is high. Slopes are generally 40-65% with some areas exceeding 75%.

DESIRED CONDITION:
The desired condition of this unit is to harvest timber over a 150 year rotation and meet partial retention. After harvest there will be a light to moderate amount of retention through the unit. Maintain stilted root trees of any species, snags, trees with large branches (greater than 3") for nesting platforms and large diameter trees with heart rot for cavity nesting birds. Harvest activity will mimic the vegetative patterns of a landslide in the lower portion of this unit and alpine meadows in the northern portion. No road construction in section A and the northern half of section B. Minimize sediment transport into King George Creek. Maintain slope stability.

PRESCRIPTION DIRECTION:
The objectives of this unit can best be met by two-aged management. The unit is divided into several sections in order to implement harvest prescriptions in the following manner. Sections A and D will be harvested by helicopter, using individual tree selection and retaining 50% of the basal area over these sections. Section B will be harvested by helicopter using overstory removal and retaining 30% of the basal area. Section E will be harvested by cable (skyline yarding, if suitable anchor trees are available), while retaining 10 % of the basal area. There will be an island of unharvested timber in section B. The boundary will be feathered to enhance appearance. Retention will include seedtrees of yellow-cedar and Sitka spruce whenever possible. Retention should be as windfirm as possible. Regeneration of the unit will be natural seeding by adjacent trees and seed trees. Future stand treatments may involve limited thinning or sanitation to favor spruce, cedar and growth of trees with good form for timber. These treatments will also seek to maintain 10-30% of the trees as future snags and large trees for structural diversity. Leave 100' buffer along the edge of the floodplain of King George Creek and along all tributaries. The area below the road in section E should have full suspension to minimize disturbance of the steep slopes. Maintain rooting strength by retaining windfirm trees, this will reduce the risk of affecting slope stability. Protect streams as shown on unit map. The lower portion of section B will be designated by the fishery biologist/technician.

UNIT 18

Alternatives 2 & 5



Proposed Roads

Class 1 Streams

Class 2 Streams

Class 3 Streams

★ Eagle Nest Tree

E Proposed Log Transfer Facility

Proposed cut units

Adjacent proposed units

Saltwater and Lakes

TTRA Buffers

Scale: 4 inches = 1 mile

A Section

PR1 Prescription

King George Timber Sale Unit Number 19 In Alternative 2, 3, 5

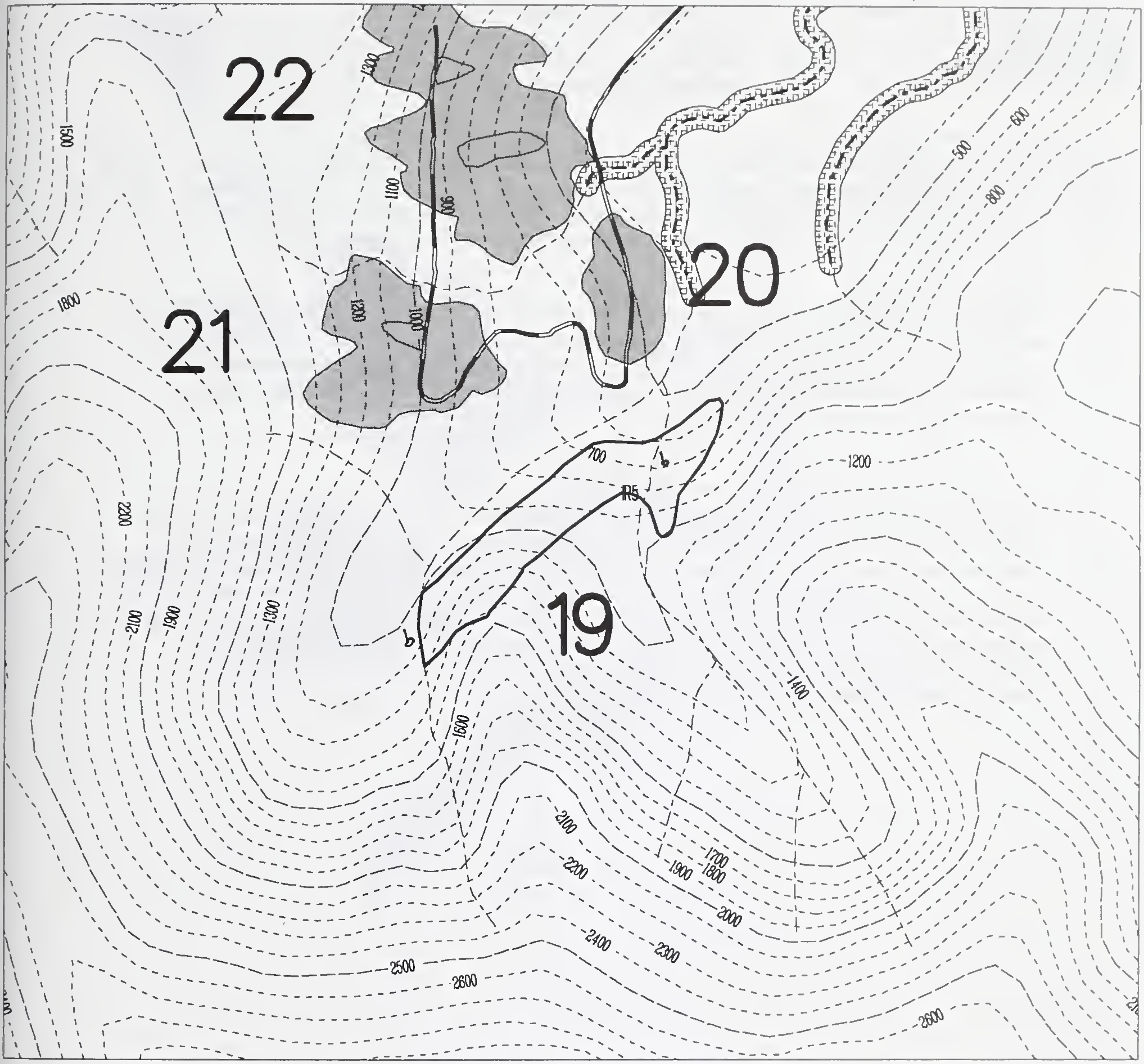
Compartment 156 VCU 462 Total Acres 36 Harvest Acres 36
Harvest method helicopter Volume Harvested 348 MBF

EXISTING CONDITION:
The unit is visible from Bessie Peak and is located in the Bessie land unit. There are two class III streams within and bordering this unit. There is extensive porcupine activity and bole rot within the.western hemlock. There are steep slopes on the southwest side of the unit and adjacent to the stream on this side of the unit.

DESIRED CONDITION:
The desired condition of this unit is to harvest timber over a 150 year rotation and meet modification. After harvest there will be a moderate amount of retention through the unit. Maintain stilted root trees of any species, snags, trees with large branches (greater than 3") for nesting platforms and large diameter trees with heart rot for cavity nesting birds. Harvest activity will mimic the natural vegetative patterns of alpine. Minimize sediment transport into King George Creek.

PRESCRIPTION DIRECTION:
The objectives of this unit can best be met by two-aged management. This unit will be harvested by helicopter, while using individual tree selection and retaining 50% of the basal area. Retention will include seedtrees of yellow-cedar and Sitka spruce whenever possible. Retention should be as windfirm as possible. Regeneration of the unit will be natural seeding by adjacent trees and seed trees. Future stand treatments may involve limited thinning or sanitation to favor spruce, cedar and growth of trees with good form for timber. These treatments will also seek to maintain 10-20% of the trees as future snags and large trees for structural diversity. Helicopter logging and retaining 50 % of the basal area should provide adequate protection to prevent adverse impacts to the soil and water resource by minimizing soil disturbance and maintaining rooting strength. Protect streams as shown on the unit map.

UNIT 19 Alternatives 2, 3 & 5



Proposed Roads

Class 1 Streams

Class 2 Streams

Class 3 Streams

★ Eagle Nest Tree

E Proposed Log Transfer Facility

Proposed cut units

Adjacent proposed units

Saltwater and Lakes

TTRA Buffers

Scale: 4 inches = 1 mile

A Section

PR1 Prescription

King George Timber Sale Unit Number 20 In Alternative 2, 3, 5

Compartment 156 VCU 462 Total Acres 16 Harvest Acres 16
Harvest method cable Volume Harvested 570 MBF

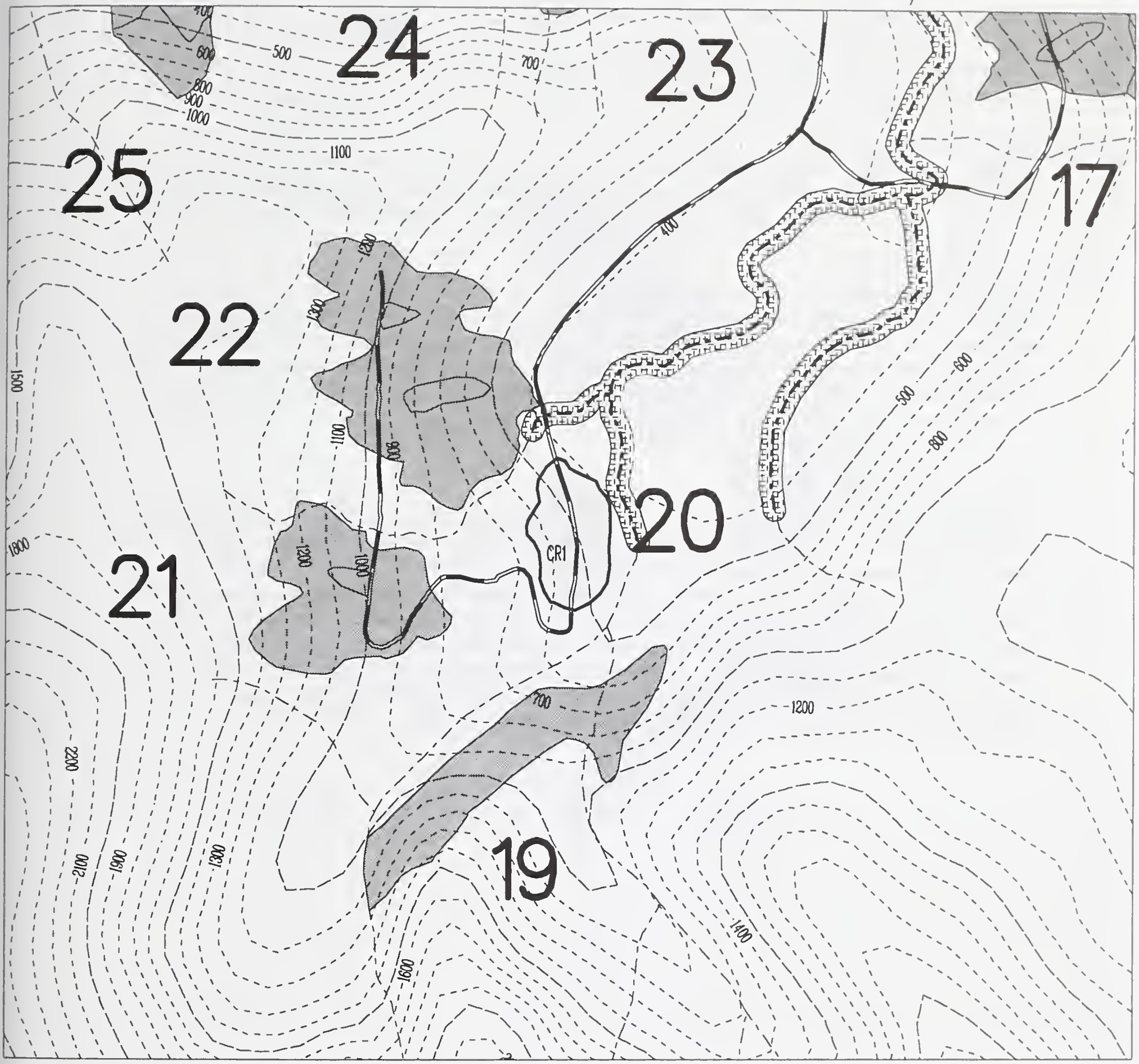
EXISTING CONDITION:
The unit is visible from Bessie Peak and is located in the Bessie land unit. There are not any mapped streams within this unit, although a class II stream approaches the east boundary. There is extensive porcupine activity and bole rot within the western hemlock. The unit is located in high quality brown creeper and marten habitat. There are 6 acres of forested wetlands on the east side of this unit.

DESIRED CONDITION:
The desired condition of this unit is to harvest timber over a 150 year rotation and meet modification. After harvest there will be a light amount of retention through the unit. Maintain stilted root trees of any species, snags, trees with large branches (greater than 3") for nesting platforms and large diameter trees with heart rot for cavity nesting birds. Feather unit boundary to help blend the unit into the landscape. Minimize sediment transport to King George Creek.

PRESCRIPTION DIRECTION:
The objectives of this unit can best be met by two-aged management. This unit will be harvested by using individual tree selection and retaining 10% of the basal area. Retention will include seedtrees of yellow-cedar and Sitka spruce whenever possible. Retention should be as windfirm as possible. Regeneration of the unit will be natural seeding by adjacent trees and seed trees. Future stand treatments may involve limited thinning or sanitation to favor spruce, cedar and growth of trees with good form for timber. These treatments will also seek to maintain 5-10 % of the trees as future snags and large trees for structural diversity. Uphill cable yarding will minimize disturbance to the wetland soils. Maintain 100' buffer between stream and the unit boundary.

UNIT 20

Alternatives 2, 3 & 5



Proposed Roads

Class 1 Streams

Class 2 Streams

Class 3 Streams

★ Eagle Nest Tree

E Proposed Log Transfer Facility

Proposed cut units

Adjacent proposed units

Saltwater and Lakes

TTRA Buffers

Scale: 4 inches = 1 mile

A Section
PR1 Prescription

King George Timber Sale Unit Number 21 In Alternative 2, 3, 5

Compartment 156 VCU 462 Total Acres 37 Harvest Acres 36
Harvest method cable Volume Harvested 541 MBF

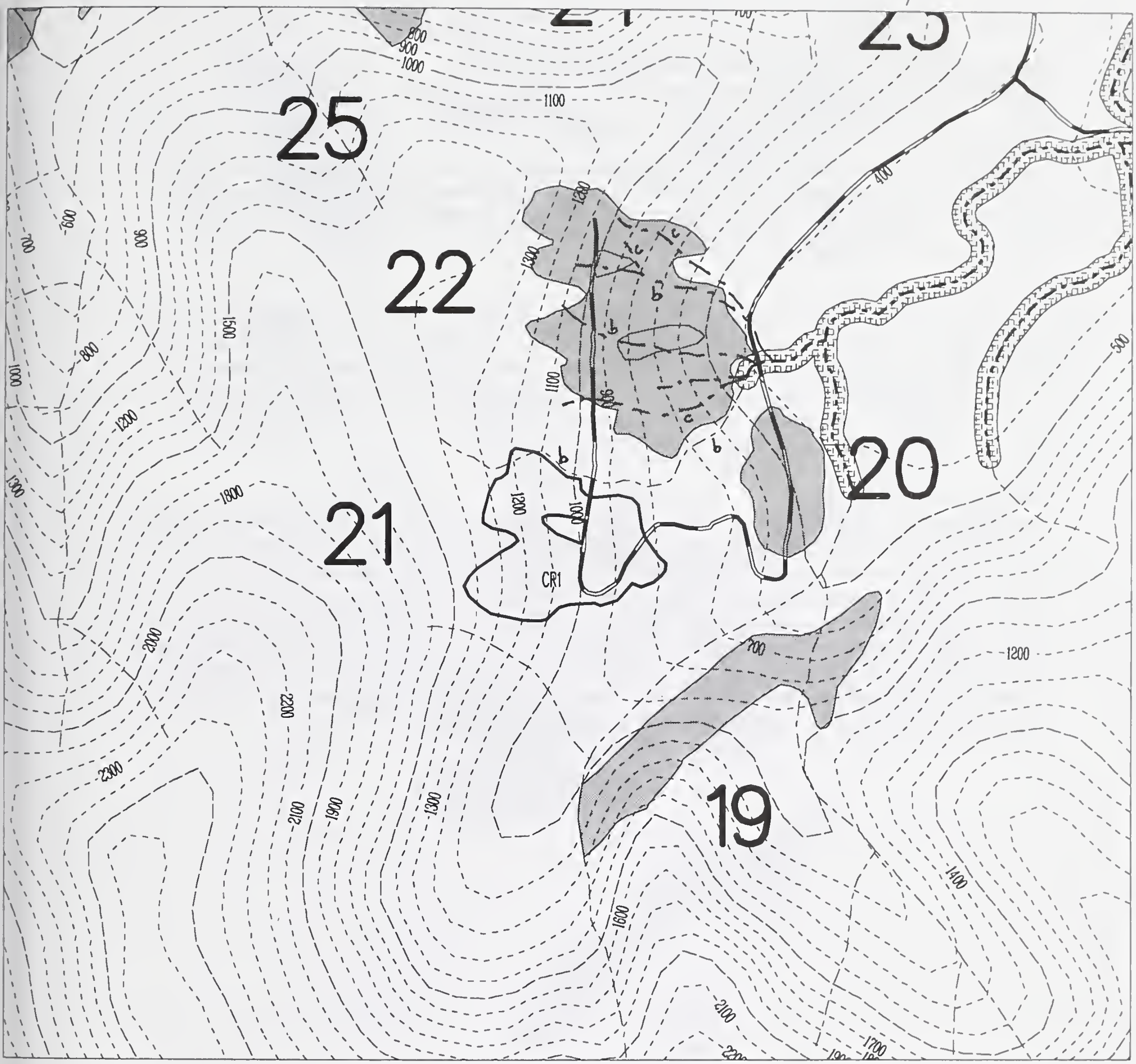
EXISTING CONDITION:
The unit is visible from Bessie Peak and is located in the Bessie land unit. There is one class III stream north of the unit boundary which is a tributary to a class I fish habitat. There is extensive porcupine activity and bole rot within the western hemlock. There are 6 acres of forested wetlands on the east side of this unit.

DESIRED CONDITION:
The desired condition of this unit is to harvest timber over a 150 year rotation and meet modification. After harvest there will be 10-15% retention throughout the unit. Maintain stilted root trees of any species, snags, trees with large branches (greater than 3") for nesting platforms and large diameter trees with heart rot for cavity nesting birds. Feather unit boundary to help blend the unit into the landscape. Leave an island of unmanaged timber west of the road to help absorb visual impact of harvest from Bessie Peak. Minimize sediment transport into King George Creek.

PRESCRIPTION DIRECTION:
The objectives of this unit can best be met by two-aged management. This unit will be harvested by using individual tree selection and retaining 10% of the basal area. Retention will include seedtrees of yellow-cedar and Sitka spruce whenever possible. Retention should be as windfirm as possible. Remove windthrow prone trees adjacent to the stream north of this unit that is west of the road. Regeneration of the unit will be natural seeding by adjacent trees and seed trees. Future stand treatments may involve limited thinning or sanitation to favor spruce, cedar and growth of trees with good form for timber. These treatments will also seek to maintain 5-10% of the trees as future snags and large trees for structural diversity. Use partial suspension below the road and the southern portion of the unit to minimize disturbance to the wetland soils. Protect streams as shown on the unit map.

UNIT 21

Alternatives 2, 3 & 5



Proposed Roads

Class 1 Streams

Class 2 Streams

Class 3 Streams

★ Eagle Nest Tree

E Proposed Log Transfer Facility

Proposed cut units

Adjacent proposed units

Saltwater and Lakes

TTRA Buffers

Scale: 4 inches = 1 mile

A Section

PR1 Prescription

King George Timber Sale Unit Number 22 In Alternative 2, 3, 5

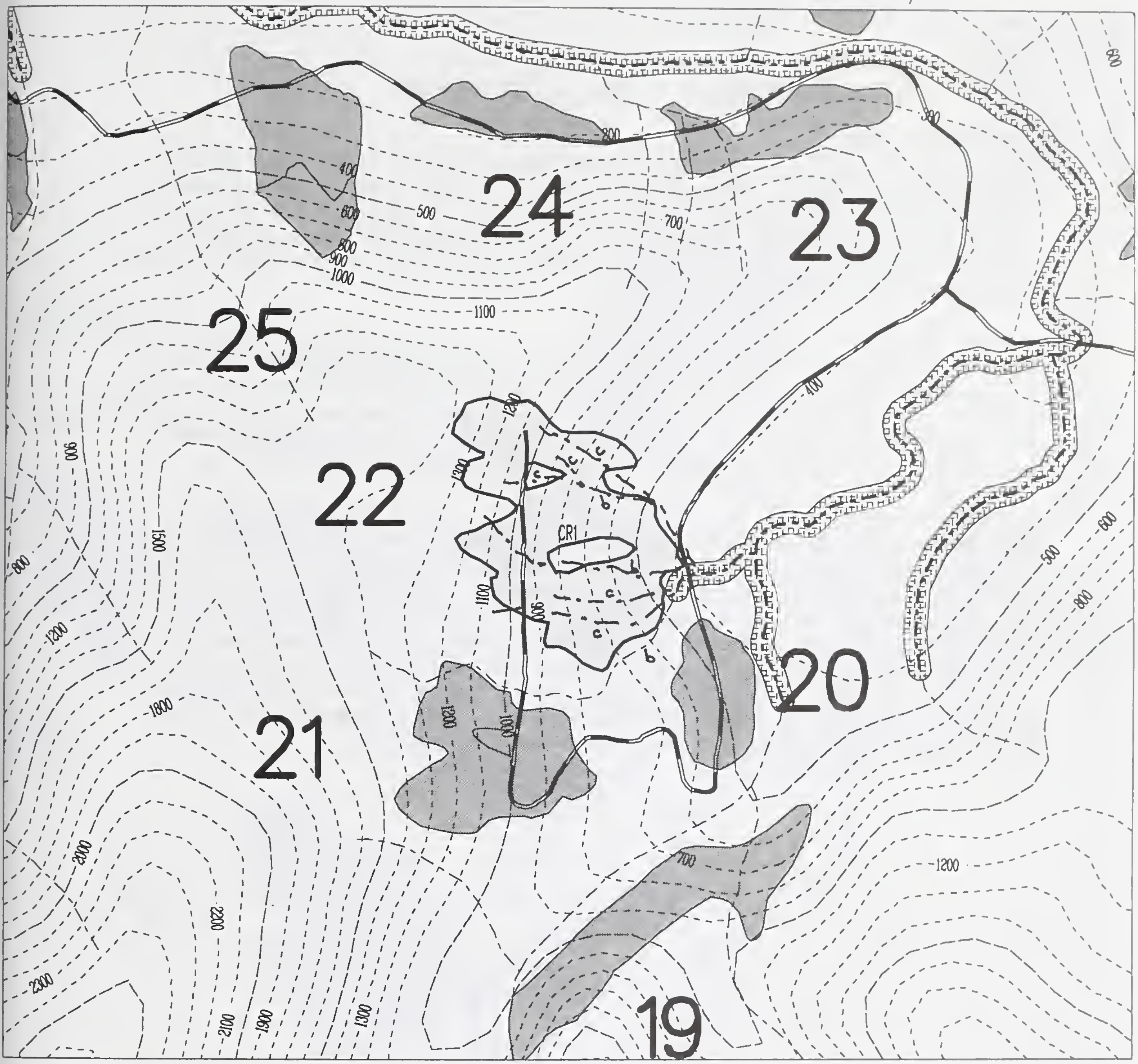
Compartment 156 VCU 462 Total Acres 65 Harvest Acres 61
Harvest method cable Volume Harvested 2106 MBF

EXISTING CONDITION:
The unit is visible from Bessie Peak and is located in the Bessie land unit. There are eight class III streams within this unit, which are tributary to class I habitat. There is extensive porcupine activity and bole rot within the western hemlock. This unit contains high brown creeper habitat and high deer winter range. About half of this unit contains high marten habitat.

DESIRED CONDITION:
The desired condition of this unit is to harvest timber over a 150 year rotation and meet modification. After harvest there will be a light amount of retention through the unit. Maintain stilted root trees of any species, snags, trees with large branches (greater than 3") for nesting platforms and large diameter trees with heart rot for cavity nesting birds. Feather unit boundary to help blend the unit into the landscape. Leave two islands of unmanaged timber within the unit to help absorb visual impact of harvest from Bessie Peak. Minimize sediment transport into King George Creek.

PRESCRIPTION DIRECTION:
The objectives of this unit can best be met by two-aged management. This unit will be harvested by using individual tree selection and retaining 10% of the basal area. Retention will include seedtrees of yellow-cedar and Sitka spruce whenever possible. Retention should be as windfirm as possible, particularly adjacent to streams. Regeneration of the unit will be natural seeding by adjacent trees and seed trees. Future stand treatments may involve limited thinning or sanitation to favor spruce, cedar and growth of trees with good form for timber. These treatments will also seek to maintain 5-10 % of the trees as future snags and large trees for structural diversity. Cut slopes along road should be revegetated with native seed mix before pulling drainage structures. The unit should have feathered edges and leave one island within the unit to blend the unit into the landscape. Protect streams as shown on unit map.

UNIT 22 Alternatives 2, 3 & 5



Proposed Roads

Class 1 Streams

Class 2 Streams

Class 3 Streams

★ Eagle Nest Trèe

E Proposed Log Transfer Facility

Proposed cut units

Adjacent proposed units

Saltwater and Lakes

TTRA Buffers

Scale: 4 inches = 1 mile

A Section

PR1 Prescription

King George Timber Sale Unit Number 23 In Alternative 2, 5

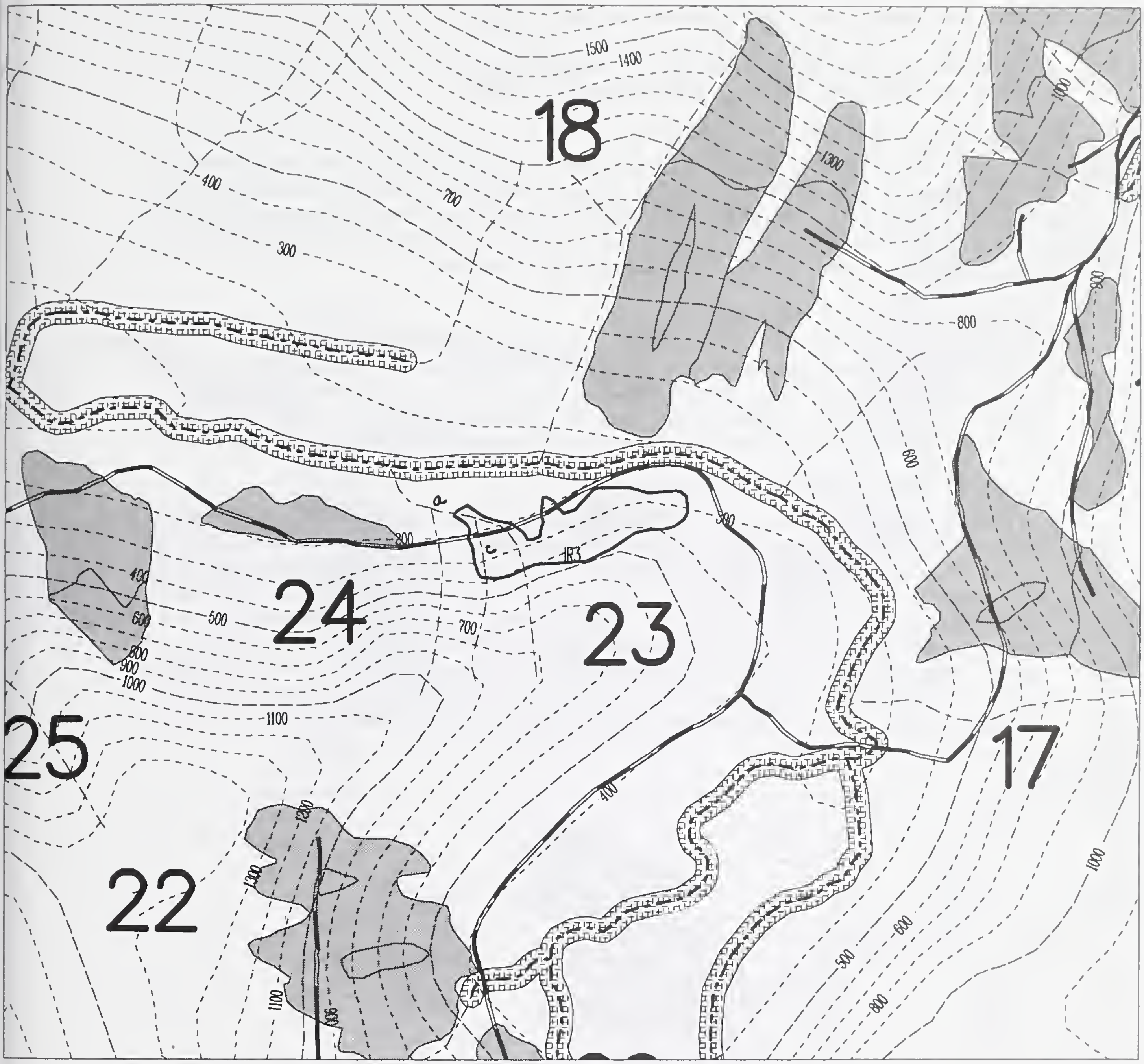
Compartment 156 VCU 462 Total Acres 19 Harvest Acres 19
Harvest method cable with some shovel Volume Harvested 504 MBF

EXISTING CONDITION:
The unit is located in the King George land unit and is not visible from saltwater. There is one class III stream within this unit, which is a tributary to class I and II habitat. King George Creek flows north of this unit. There is extensive porcupine activity and bole rot within the western hemlock. Half of this unit contains high brown creeper habitat. This unit also contains high marten and bear habitat and high deer winter range. There are oversteepened slopes south of this unit. There are slopes within the unit that would prevent the entire unit from being shovel yarded.

DESIRED CONDITION:
The desired condition of this unit is to harvest timber over a 150 year rotation. After harvest there will be a moderate amount of retention in the unit. Maintain stilted root trees of any species, snags, trees with large branches (greater than 3") for nesting platforms and large diameter trees with heart rot for cavity nesting birds. Maintain travel corridor for large mammals. Close this segment of the road post harvest to help reduce impacts on the wildlife travel corridor. Minimize sediment transport into King George Creek.

PRESCRIPTION DIRECTION:
The objectives of this unit can best be met by two-aged management. This unit will be harvested by using individual tree selection and retaining 30% of the basal area. During layout, avoid oversteepened slopes that are south of the unit. Retention will include seedtrees of yellow-cedar and Sitka spruce whenever possible. Feather the northern unit boundary to maintain windfirmness of the stream buffer. Retention should be as windfirm as possible. Regeneration of the unit will be natural seeding by adjacent trees and seed trees. Future stand treatments may involve limited thinning or sanitation to favor spruce, cedar and growth of trees with good form for timber. These treatments will also seek to maintain 10 % of the trees as future snags and large trees for structural diversity. Exclude floodplain from the unit and ensure that the unit boundary provides 100' buffer along class I and II streams. Protect class III stream as shown.

UNIT 23 Alternatives 2 & 5



Proposed Roads

Class 1 Streams

Class 2 Streams

Class 3 Streams

★ Eagle Nest Tree

E Proposed Log Transfer Facility

Proposed cut units

Adjacent proposed units

Saltwater and Lakes

TTRA Buffers

Scale: 4 inches = 1 mile

A Section

PR1 Prescription

King George Timber Sale Unit Number 24 In Alternative 2, 5

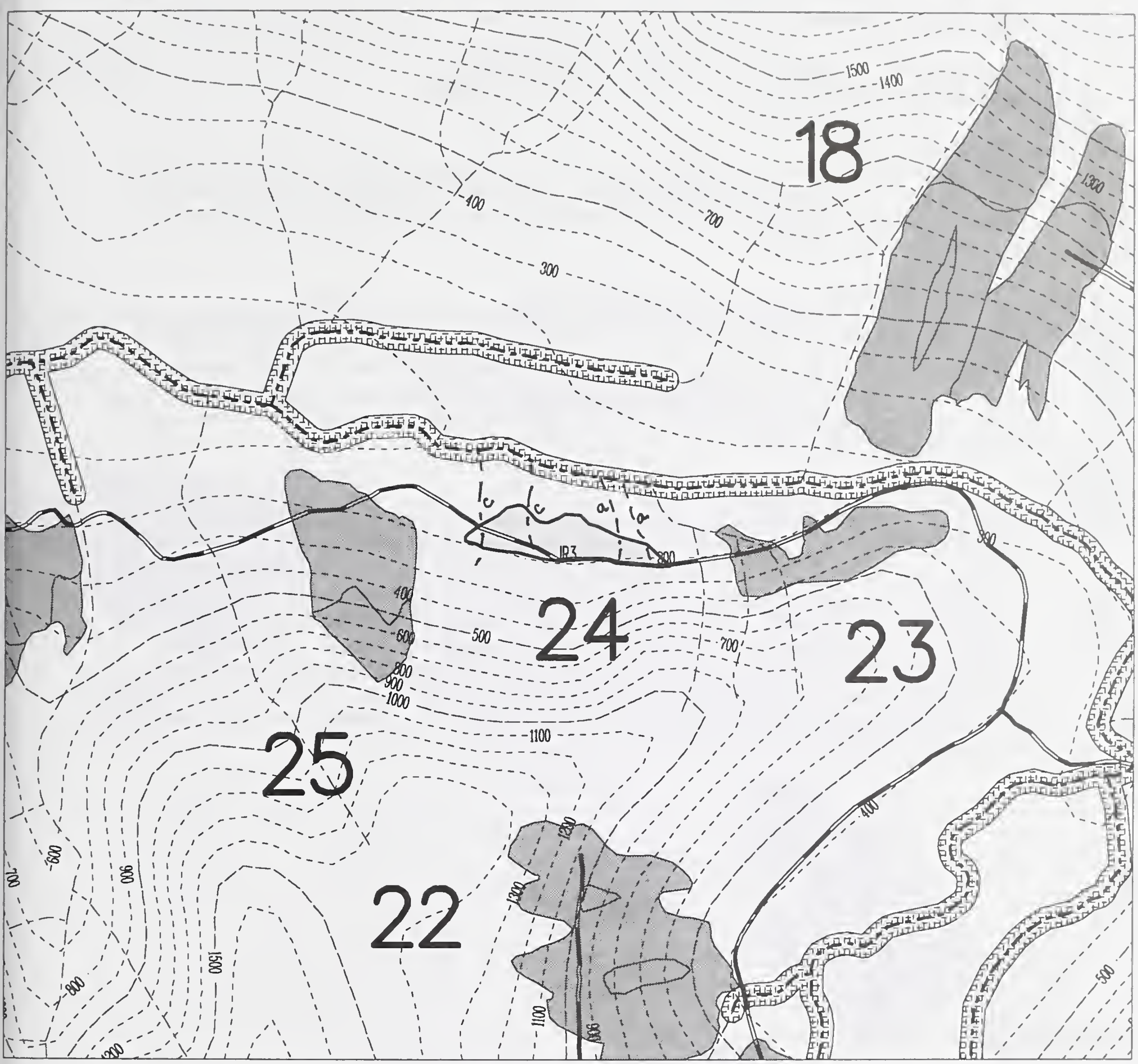
Compartment 156 VCU 462 Total Acres 11 Harvest Acres 11
Harvest method cable or shovel Volume Harvested 250 MBF

EXISTING CONDITION:
The unit is located in the King George land unit and is not visible from saltwater. The soil is well drained. The unit contains two class III streams which are tributary to class I habitat. There is a class II stream East of the unit boundary. King George Creek floodplain is North of this unit. There is extensive porcupine activity and bole rot within the western hemlock. Half of this unit contains high brown creeper habitat. This unit also contains high marten and bear habitat and high deer winter range.

DESIRED CONDITION:
The desired condition of this unit is to harvest timber over a 150 year rotation. After harvest there will be a moderate amount of retention through the unit. Maintain stilted root trees of any species, snags, trees with large branches (greater than 3") for nesting platforms and large diameter trees with heart rot for cavity nesting birds. Maintain travel corridor for large mammals. Close this segment of the road post harvest to help reduce impacts on the wildlife travel corridor. Minimize sediment transport into King George Creek.

PRESCRIPTION DIRECTION:
The objectives of this unit can best be met by two-aged management. This unit will be harvested by using individual tree selection and retaining 30% of the basal area. During layout, avoid oversteepened slopes that are south of the unit. Retention will include seedtrees of yellow-cedar and Sitka spruce whenever possible. Feather the northern unit boundary to maintain windfirmness of the floodplain buffer. Retention should be as windfirm as possible, particularly next to streams. Regeneration of the unit will be natural seeding by adjacent trees and seed trees. Future stand treatments may involve limited thinning or sanitation to favor spruce, cedar and growth of trees with good form for timber. These treatments will also seek to maintain 10 % of the trees as future snags and large trees for structural diversity. If the unit is cable yarded, partial suspension will be required to protect the soil surface. Stream protection is shown on the unit map. The unit is suitable for shovel logging.

UNIT 24 Alternatives 2 & 5



Proposed Roads	Proposed cut units
Class 1 Streams	Adjacent proposed units
Class 2 Streams	Saltwater and Lakes
Class 3 Streams	TTRA Buffers
★ Eagle Nest Tree	Scale: 4 inches = 1 mile
E Proposed Log Transfer Facility	A Section PR1 Prescription

King George Timber Sale Unit Number 25 In Alternative 2, 5

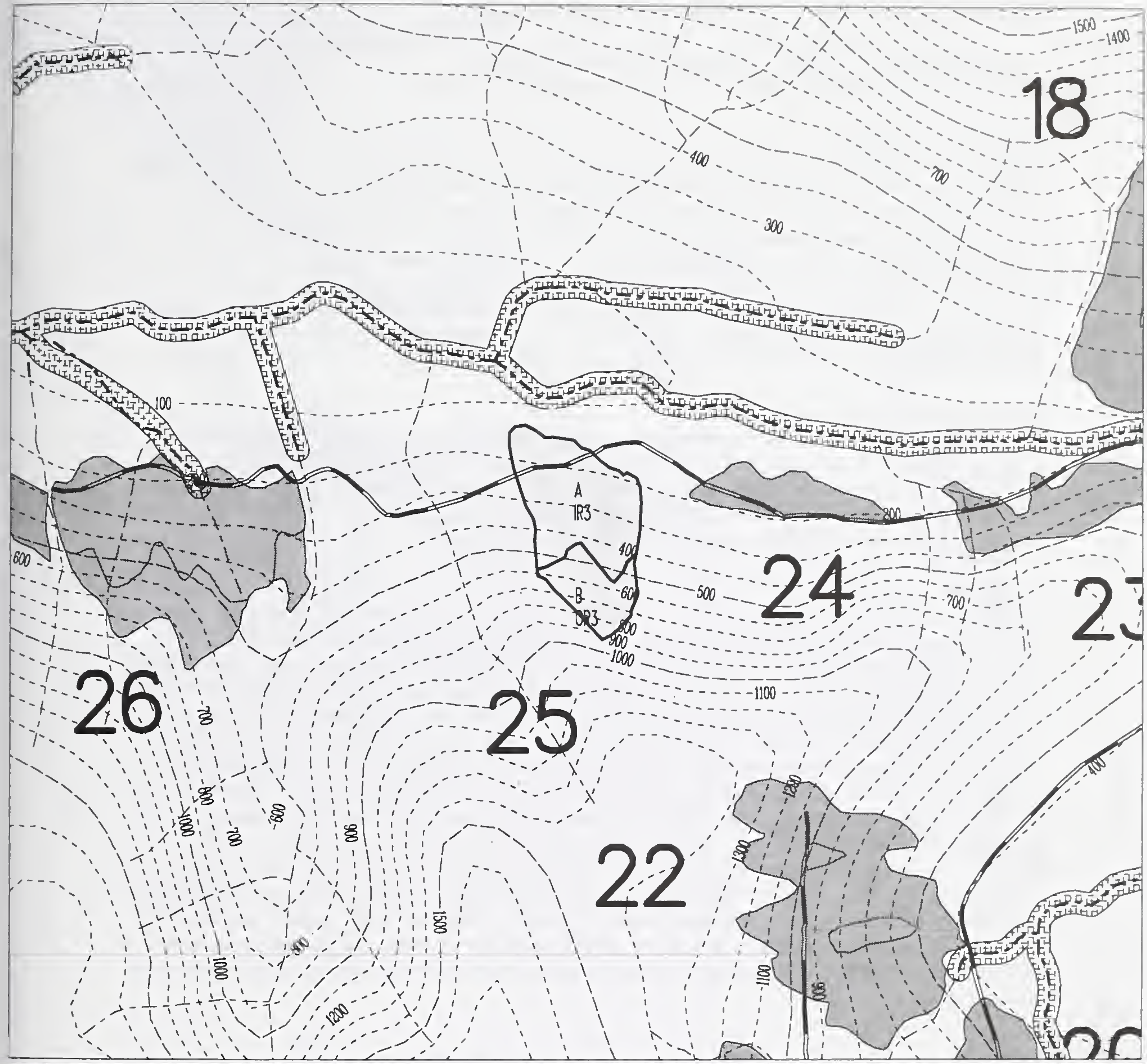
Compartment 156 VCU 462 Total Acres 31 Harvest Acres 31
Harvest method cable & helicopter Volume Harvested 712 MBF

EXISTING CONDITION:
The unit is located in the King George land unit and is visible from King George Bay. There are no mapped streams within this unit. King George Creek floodplain lies north of this unit. There is extensive porcupine activity and bole rot within the western hemlock. Half of this unit contains high brown creeper and marten habitat and high deer winter range.

DESIRED CONDITION:
The desired condition of this unit is to harvest timber over a 150 year rotation and meet partial retention. After harvest, there will be a moderate amount of retention through the unit. Maintain stilted root trees of any species, snags, trees with large branches (greater than 3") for nesting platforms and large diameter trees with heart rot for cavity nesting birds. Maintain travel corridor for large mammals. Close this segment of the road post harvest to help reduce impacts on the wildlife travel corridor. Minimize sediment transport into King George Creek.

PRESCRIPTION DIRECTION:
The objectives of this unit can best be met by two-aged management. The northern portion of this unit, below the road, can be shovel yarded. Helicopter yard the southern portion of this unit that is beyond the cable reach to reduce visual impact of the backline. The backline should have a 'V' shape to give more of a vertical appearance. Section A of this unit will be harvested by using individual tree selection and retaining 30% of the basal area. Section B will be harvested by overstory removal and retain 30 % of the basal area. Retention will include seedtrees of yellow-cedar and Sitka spruce whenever possible. Retention should be as windfirm as possible. Regeneration of the unit will be natural seeding by adjacent trees and seed trees. Future stand treatments may involve limited thinning or sanitation to favor spruce, cedar and growth of trees with good form for timber. These treatments will also seek to maintain 10 % of the trees as future snags and large trees for structural diversity.

UNIT 25 Alternatives 2 & 5



Proposed Roads

Class 1 Streams

Class 2 Streams

Class 3 Streams

★ Eagle Nest Tree

E Proposed Log Transfer Facility

Proposed cut units

Adjacent proposed units

Saltwater and Lakes

TTRA Buffers

Scale: 4 inches = 1 mile

A Section
PR1 Prescription

King George Timber Sale Unit Number 26 In Alternative 2, 5

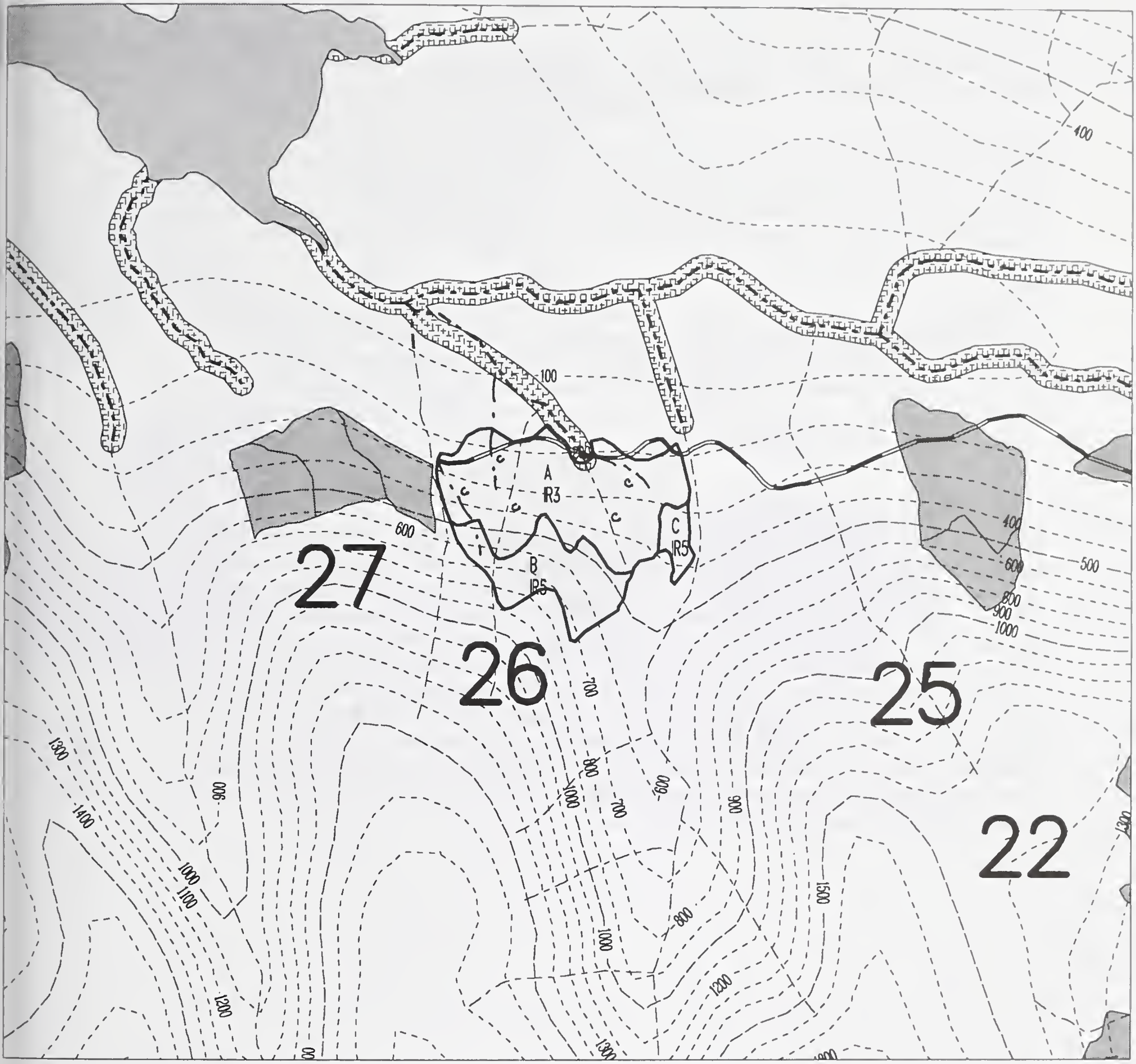
Compartment 156 VCU 462 Total Acres 61 Harvest Acres 61
Harvest method cable & helicopter Volume Harvested 1124 MBF

EXISTING CONDITION:
The unit is located in the King George land unit and is visible from King George Bay at an oblique angle. There is extensive porcupine activity and bole rot within the western hemlock. This unit contains five streams in and around this unit. Stream 1 is a class III stream. Stream 2 is a class III stream and contains two other streams in this location as well. Stream 3 is a class II stream up to the northern boundary of this unit and then is a class III stream within the unit. Stream 4 is a class II stream that is along the eastern boundary. Stream 5 is a class III stream that is south of this unit and flows into stream 4. There are 14 acres of forested wetlands along the northern part of this unit. There are 2 acres of high hazard soils along the southwestern part of the unit adjacent to the stream. This unit contains high marten habitat. There is existing scattered blowdown within the helicopter portion of this unit.

DESIRED CONDITION:
The desired condition of this unit is to harvest timber over a 150 year rotation and meet partial retention. After harvest there will be a moderate amount of retention through the unit. Maintain stilted root trees of any species, snags, trees with large branches (greater than 3") for nesting platforms and large diameter trees with heart rot for cavity nesting birds. Maintain travel corridor for large mammals. Close this segment of the road post harvest to help reduce impacts on the wildlife travel corridor.

PRESCRIPTION DIRECTION:
The objectives of this unit can best be met by two-aged management. The northern portion of this unit, below the road, can be shovel yarded. Extend unit up the slope above cable reach and harvest using helicopter, this will blend the unit better into the landscape. The backline of the unit boundary should utilize a 'V' shaped design to give the unit more of a vertical appearance. Section A of this unit will be harvested by using individual tree selection and retaining 30% of the basal area. Sections B and C will be harvested by individual tree selection and retain 50 % of the basal area. Retention will include seedtrees of yellow-cedar and Sitka spruce whenever possible. Retention should be as windfirm as possible. Regeneration of the unit will be natural seeding by adjacent trees and seed trees. Future stand treatments may involve limited thinning or sanitation to favor spruce, cedar and growth of trees with good form for timber. These treatments will also seek to maintain 10-30% of the trees as future snags and large trees for structural diversity. Streams 1, 2 and 5 will have streamcourse protection clause 'C' applied. Stream 4 will have streamcourse protection clause "A" applied. Stream 3 will have streamcourse protection clause 'C' applied within the unit and streamcourse protection clause 'A' applied to the portion of the stream north of the unit. Yard away from class III streams; if not possible, partially suspend over them. Use full suspension across the high hazard soils if split line yarding is not used. Feather unit boundary and the transition between cable and helicopter.

UNIT 26 Alternatives 2 & 5



Proposed Roads	Proposed cut units
Class 1 Streams	Adjacent proposed units
Class 2 Streams	Saltwater and Lakes
Class 3 Streams	TTRA Buffers
★ Eagle Nest Tree	Scale: 4 inches = 1 mile
E Proposed Log Transfer Facility	A Section PR1 Prescription

King George Timber Sale Unit Number 27 In Alternative 1

Compartment 156 VCU 462 Total Acres 28 Harvest Acres 28
Harvest method helicopter Volume Harvested 366 MBF

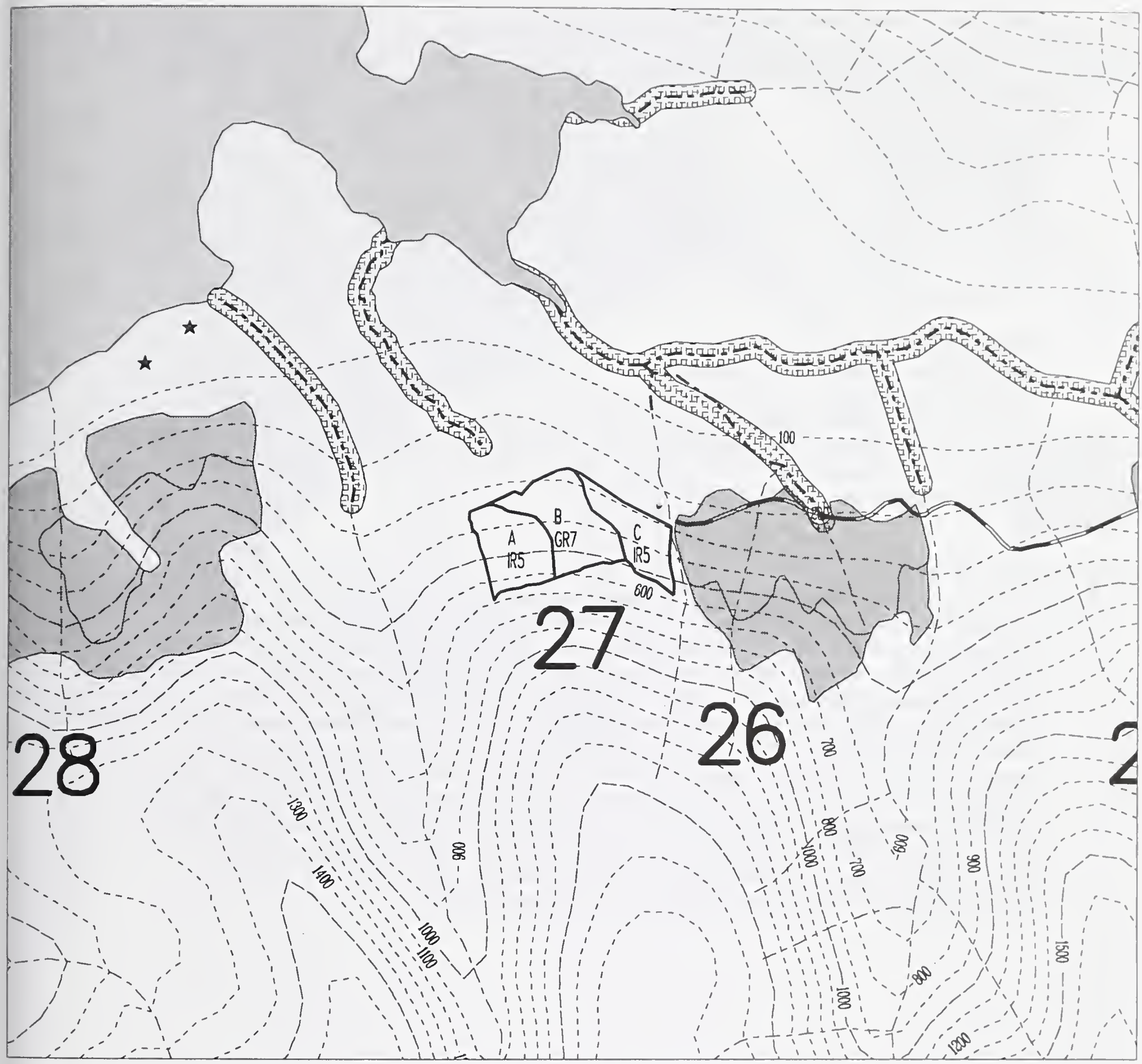
EXISTING CONDITION:
The unit is located in the King George land unit and is visible from King George Bay, the Alaska Marine Highway route and the trail corridor up to Bessie Peak. There is extensive porcupine activity and bole rot within the western hemlock. There is one class III mapped within this unit. There is 1 acre of forested wetlands within this unit. A quarter of this unit is located within high deer winter range habitat.

DESIRED CONDITION:
The desired condition of this unit is to harvest timber over a 150 year rotation and meet partial retention from ferry route. After harvest there will be a moderate to high amount of retention through the unit. Maintain stilted root trees of any species, snags, trees with large branches (greater than 3") for nesting platforms and large diameter trees with heart rot for cavity nesting birds. Maintain travel corridor for large mammals. Recreational and ferry/cruise ship passengers may notice harvest, but it should appear as a natural disturbance dispersed over the landscape.

PRESCRIPTION DIRECTION:
The objectives of this unit can best be met by uneven-aged management. The unit is highly visible and a high degree of retention will be necessary to sustain scenic quality due to the steepness of the slope and the close proximity to the viewer. Section A and C of this unit will be harvested by using individual tree selection and retaining 50% of the basal area. Section B will be harvested by group selection and 70 % of the basal area will be retained within this section. Retention will include seedtrees of yellow-cedar and Sitka spruce whenever possible. Retention should be as windfirm as possible. Regeneration of the unit will be natural seeding by adjacent trees and seed trees. Future stand treatments may involve limited thinning or sanitation to favor spruce, cedar and growth of trees with good form for timber. These treatments will also seek to maintain 10-30% of the trees as future snags and large trees for structural diversity. The stream within this unit will have streamcourse protection clause 'C' applied. Harvesting this unit by helicopter yarding and the amount of retention left, will have minimal disturbance to the forested wetlands. Harvest the trail corridor with small groups along the ridge.

UNIT 27

Alternative 1



Proposed Roads

Class 1 Streams

Class 2 Streams

Class 3 Streams

★ Eagle Nest Tree

E Proposed Log Transfer Facility

Proposed cut units

Adjacent proposed units

Saltwater and Lakes

TTRA Buffers

Scale: 4 inches = 1 mile

A Section
PR1 Prescription

King George Timber Sale Unit Number 28 In Alternative 1, 4, 5

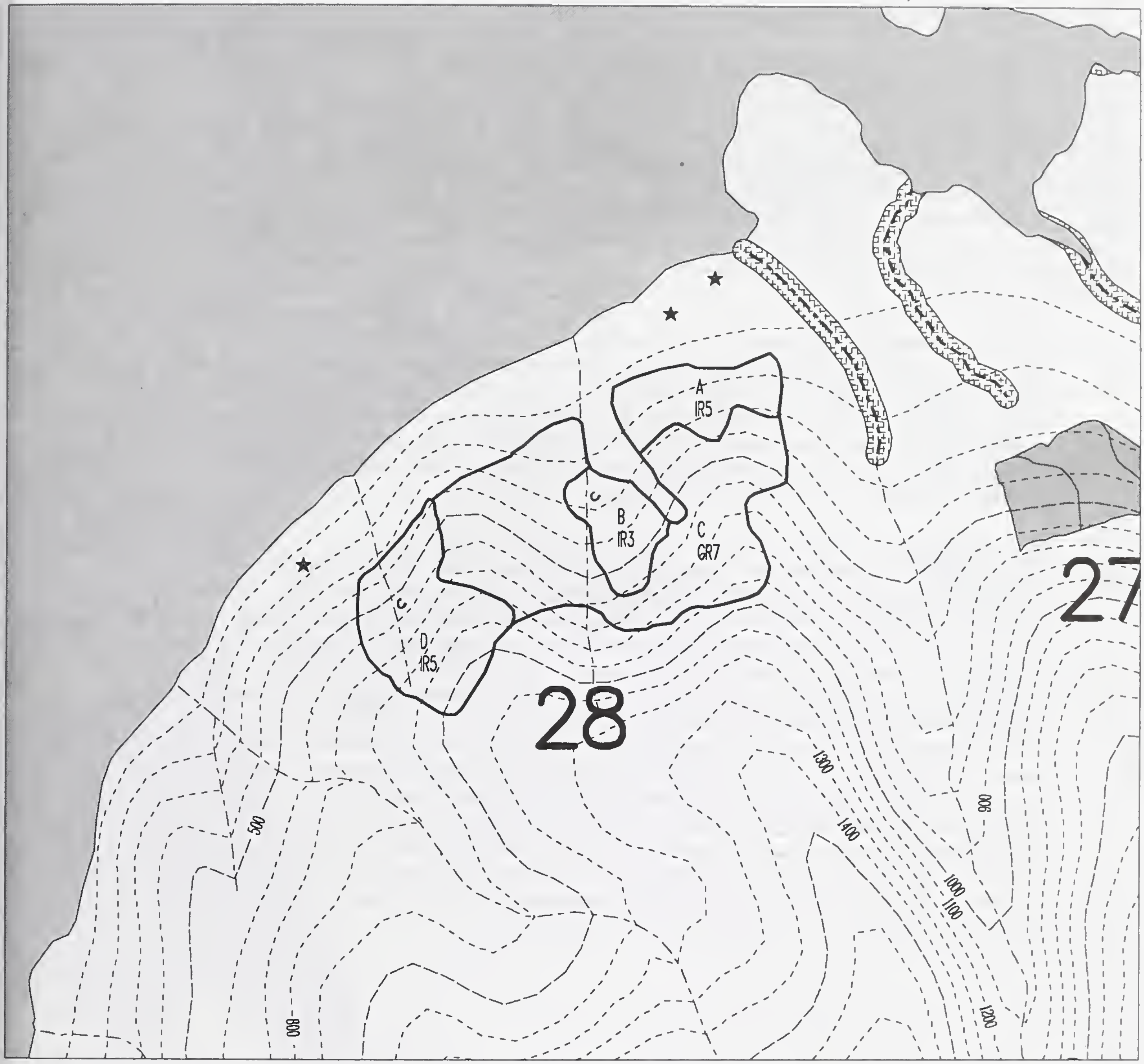
Compartment 156 VCU 462 Total Acres 140 Harvest Acres 140
Harvest method helicopter Volume Harvested 2007 MBF

EXISTING CONDITION:
The unit is located in the King George land unit and is visible from Stikine Strait and the Alaska Marine Highway route. There is extensive porcupine activity and bole rot within the western hemlock. There are 10 acres of forested wetlands within this unit. This unit contains high marten habitat. A quarter of the unit is in high deer winter range. There are two class III streams that pass through this unit and one class II stream that is East of the unit. There are three eagle nest sites north of this unit, one to the northwest and two to the northeast. The boundary of this unit is located at least 330 feet from existing eagle nest sites.

DESIRED CONDITION:
The desired condition of this unit is to harvest timber over a 150 year rotation and meet partial retention from ferry route. After harvest there will be a moderate to large amount of retention through the unit. Maintain stilted root trees of any species, snags, trees with large branches (greater than 3") for nesting platforms and large diameter trees with heart rot for cavity nesting birds. Maintain travel corridor for large mammals. Recreational and ferry/cruise ship passengers may notice harvest, but it should appear as a natural disturbance dispersed over the landscape.

PRESCRIPTION DIRECTION:
The objectives of this unit can best be met by uneven-aged management. The unit is highly visible and a high degree of retention will be necessary for scenic quality due to the steepness of the slope and the close proximity to the viewer. The unit is divided into several sections in order to implement harvest prescriptions in the following manner. Sections A & D will be harvested by individual tree selection while retaining 50% of the basal area over these sections. Section B will be harvested by individual tree selection while retaining 30% of the basal area within this section. Section C will be harvested by group selection and retaining 70% of the basal area within this section. Retention will include seedtrees of yellow-cedar and Sitka spruce whenever possible. Retention should be as windfirm as possible. Regeneration of the unit will be natural seeding by adjacent trees and seed trees. Future stand treatments may involve limited thinning or sanitation to favor spruce, cedar and growth of trees with good form for timber. These treatments will also seek to maintain 10-30% of the trees as future snags and large trees for structural diversity. The two streams within this unit will have streamcourse protection clause 'B' applied. Harvesting this unit by helicopter yarding will have minimal disturbance to the forested wetlands.

UNIT 28 Alternatives 1, 4 & 5



	Proposed Roads		Proposed cut units
	Class 1 Streams		Adjacent proposed units
	Class 2 Streams		Saltwater and Lakes
	Class 3 Streams		TTRA Buffers
★	Eagle Nest Tree		Scale: 4 inches = 1 mile
E	Proposed Log Transfer Facility	A PR1	Section Prescription

King George Timber Sale Unit Number 29 In Alternative 1, 2, 3, 4, 5

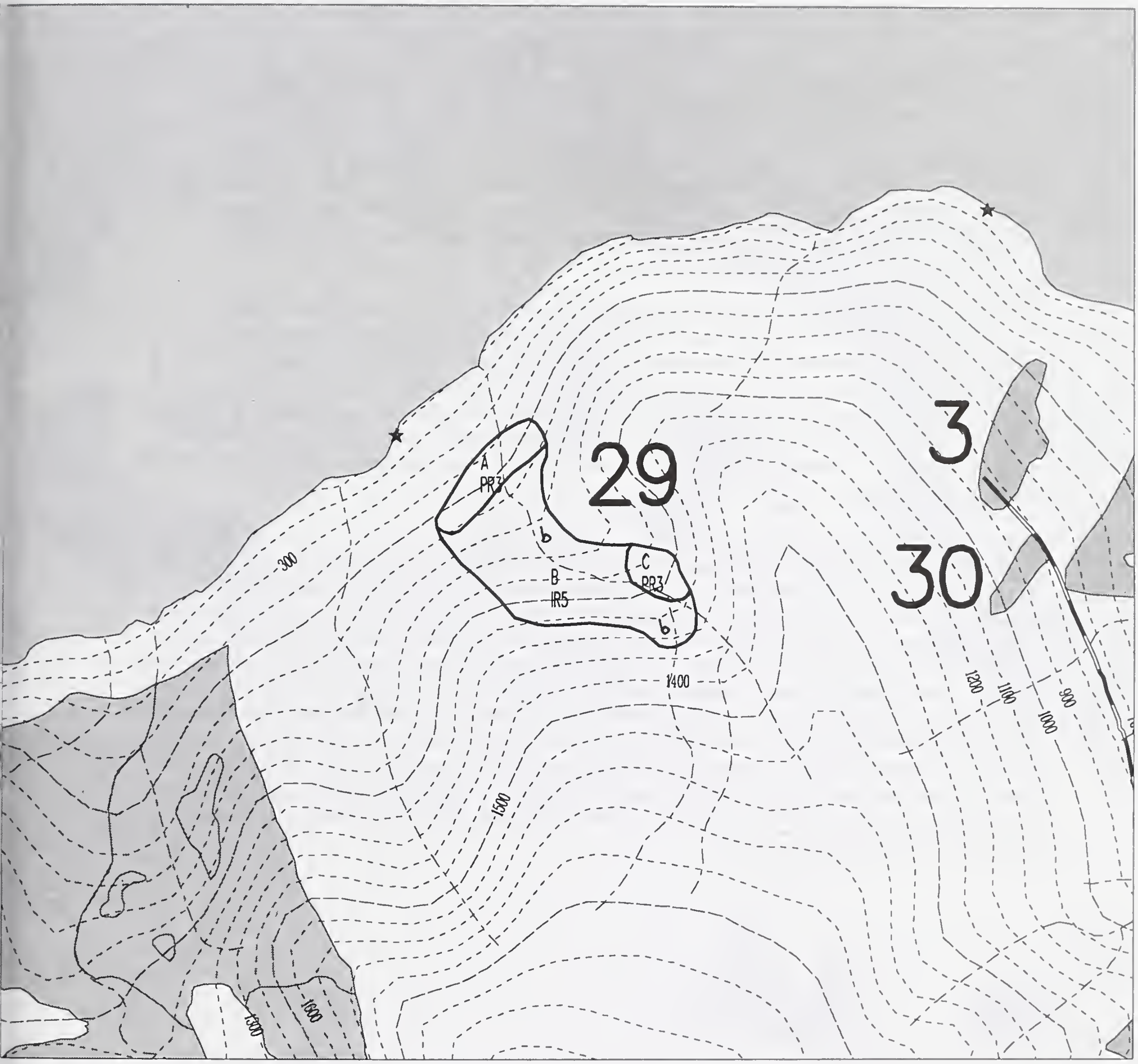
Compartment 156 VCU 462 Total Acres 48 Harvest Acres 48
Harvest method helicopter Harvest volume 788 MBF

EXISTING CONDITION:
The unit is visible along the Chichagof travel route, located in the eastern portion of the Chichagof land unit. There are two class III streams within this unit. There is extensive porcupine activity and bole rot within the western hemlock. This unit contains about 4 acres of soil types which have a very high hazard stability rating. This unit also contains 8 acres of forested wetlands. The unit is located at least 500' from a eagle nest site Northwest of the unit boundary.

DESIRED CONDITION:
The desired condition of this unit is to harvest timber over a 150 year rotation and meet partial retention. Harvest will maintain a moderate amount of retention through the unit, which will reduce fragmentation. Maintain stilted root trees of any species, snags, trees with large branches (greater than 3") for nesting platforms and large diameter trees with heart rot for cavity nesting birds. Harvest activity will mimic natural vegetative patterns such as blowdown or disease pockets. Maintain slope stability and water quality. Recreational and ferry/cruise ship passengers may notice harvest, but it should appear as a natural disturbance dispersed over the landscape.

PRESCRIPTION DIRECTION:
The objectives of this unit can best be met by uneven-aged management. The unit is divided into several sections in order to implement harvest prescriptions in the following manner. Sections A & C will be harvested by individual tree selection which will retain 30% of the basal area over these sections. Section B will be harvested by individual tree selection and retain 50% of the basal area over this section. Treatments in section B will use a variety of prescriptions. This unit will be perceived as a gradual change over time from travel routes. Retention should be as windfirm as possible, particularly adjacent to streams. It is not possible to build a road to this unit from the LTF, therefore this unit will be harvested by helicopter. Forested wetlands are not expected to have significant disturbance because of helicopter yarding and the amount of retention left. The 4 acres mapped as very high hazard stability is a depositional area from an old landslide. This slope appears stable and harvest should not contribute to instability. The entire stream length will be protected by streamcourse protection clause "B". Regeneration of harvested areas will be naturally seeded by adjacent trees and seed trees. Future stand treatments may involve limited thinning or sanitation to favor spruce, or cedar and growth of trees with good form for timber. These treatments will also seek to maintain 10-30% of the trees as future snags and large trees for structural diversity. In order to achieve this, some areas within the unit may be left untreated.

UNIT 29 All Alternatives



	Proposed Roads		Proposed cut units
	Class 1 Streams		Adjacent proposed units
	Class 2 Streams		Saltwater and Lakes
	Class 3 Streams		TTRA Buffers
★	Eagle Nest Tree		Scale: 4 inches = 1 mile
E	Proposed Log Transfer Facility	A PR1	Section Prescription

King George Timber Sale Unit Number 30 In Alternative 1, 4, 5

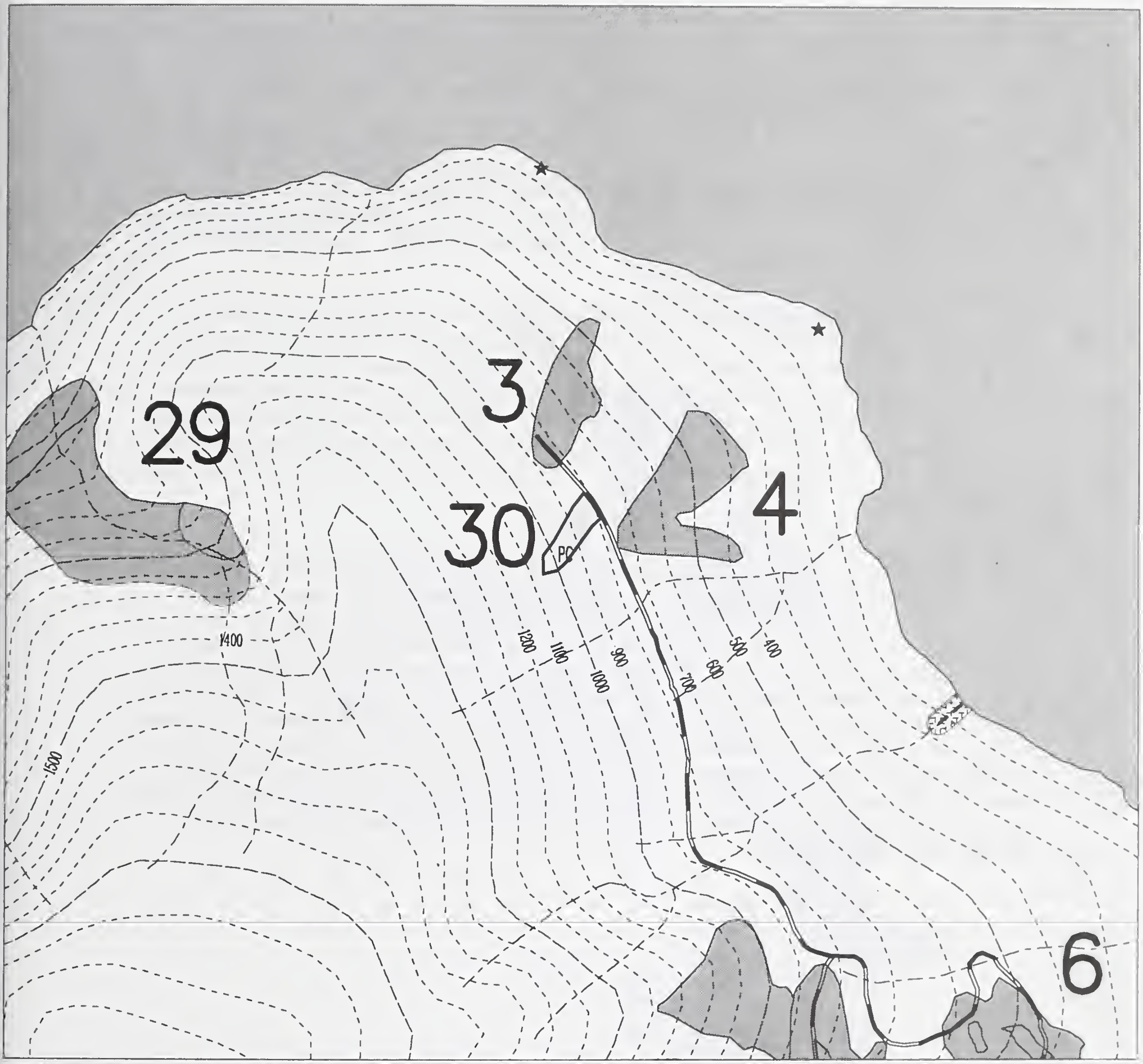
Compartment 156 VCU 462 Total Acres 3 or 10 Harvest Acres 3 or 10
Harvest method cable or helicopter Volume Harvested by cable 124 MBF
Volume Harvested by helicopter 226 MBF

EXISTING CONDITION:
The unit is located in the Zimovia Face land unit and is visible from Zimovia Strait and Zimovia highway on Wrangell Island. There are no mapped streams within this unit. There is extensive porcupine activity and bole rot within the western hemlock. This unit is located within high deer winter range habitat.

DESIRED CONDITION:
The desired condition of this unit is to harvest timber over a 100-150 year rotation and meet partial retention. There will not be any retention, if the unit is harvested using cable yarding and a moderate amount of retention, if harvest is completed using helicopter yarding. Maintain stilted root trees of any species, snags, trees with large branches (greater than 3") for nesting platforms and large diameter trees with heart rot for cavity nesting birds, if the helicopter yarding is used. Harvest activity will mimic natural vegetative patterns such as blowdown or disease pockets using helicopter yarding and mimic a landslide using cable yarding. Recreational and ferry/cruise ship passengers may notice harvest, but it should appear as a natural disturbance.

PRESCRIPTION DIRECTION:
Depending on which road option is chosen, the unit will be managed as an even-aged stand, if cable yarded or a two-aged stand, if helicopter yarded. Under the road option, this unit will be clearcut. Under the helicopter option, the unit is divided into several sections in order to implement harvest prescriptions in the following manner. Section A will be harvested by individual tree selection which will retain 30% of the basal area over this section. Section B will be harvested by individual tree selection which will retain 50% of the basal area over this section. Section C will be harvested by clearcut. Treatments in section A and B will use a variety of prescriptions. Retention should be as windfirm as possible. Regeneration of harvested areas will be naturally seeded by adjacent trees and seed trees from within the unit. Future stand treatments may involve limited thinning or sanitation to favor spruce, cedar and growth of trees with good form for timber. These treatments will also seek to maintain 10-30% of the trees as future snags and large trees for structural diversity. In order to achieve this, some areas within the unit may be left untreated, if the helicopter harvest method is used.

UNIT 30 Alternative 5



Proposed Roads

Class 1 Streams

Class 2 Streams

Class 3 Streams

Eagle Nest Tree

E Proposed Log Transfer Facility

Proposed cut units

Adjacent proposed units

Saltwater and Lakes

TTRA Buffers

Scale: 4 inches = 1 mile

A Section
PR1 Prescription

King George Timber Sale Unit Number 30 In Alternative 1, 4, 5

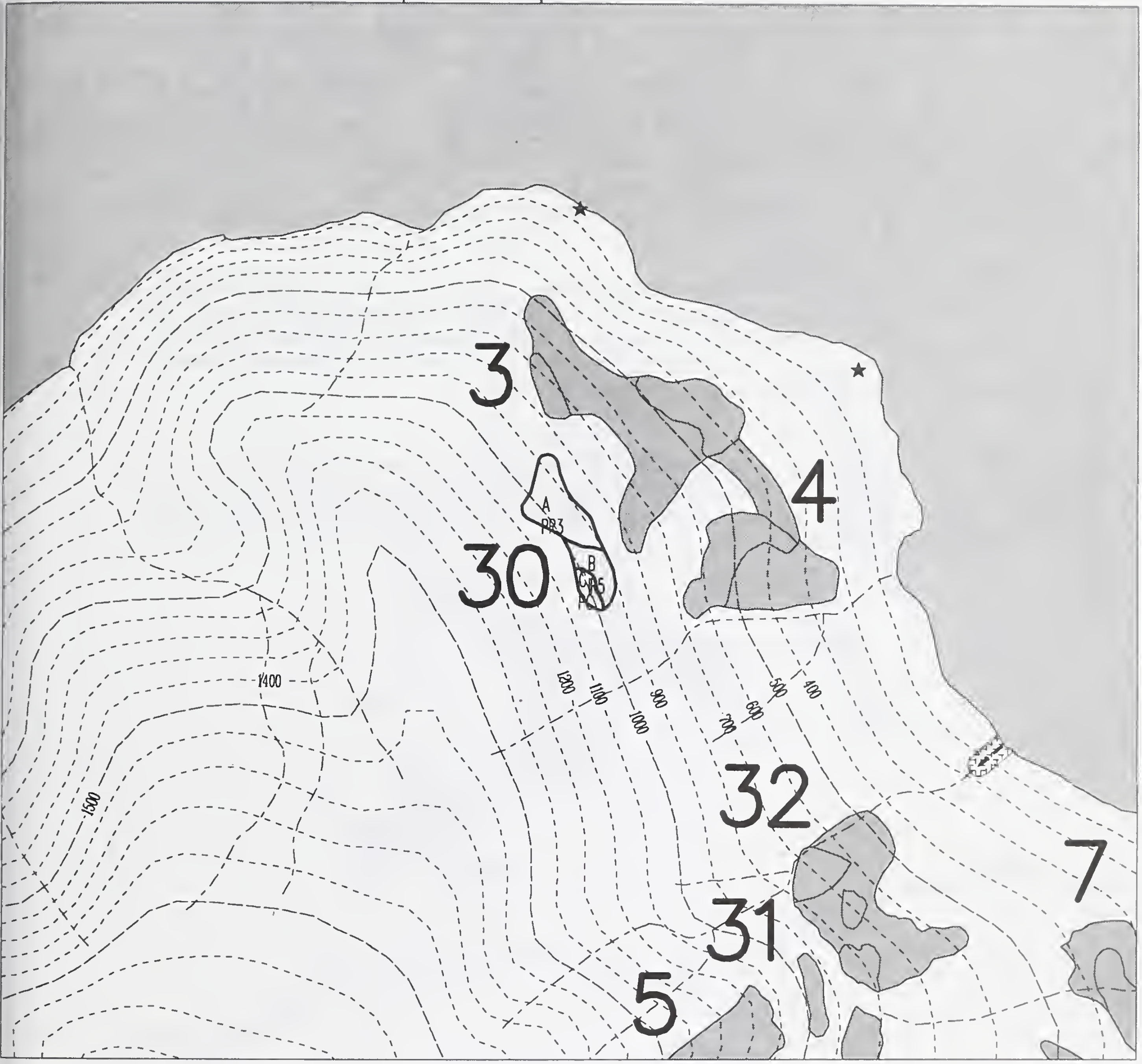
Compartment 156 VCU 462 Total Acres 3 or 10 Harvest Acres 3 or 10
Harvest method cable or helicopter Volume Harvested by cable 124 MBF
Volume Harvested by helicopter 226 MBF

EXISTING CONDITION:
The unit is located in the Zimovia Face land unit and is visible from Zimovia Strait and Zimovia highway on Wrangell Island. There are no mapped streams within this unit. There is extensive porcupine activity and bole rot within the western hemlock. This unit is located within high deer winter range habitat.

DESIRED CONDITION:
The desired condition of this unit is to harvest timber over a 100-150 year rotation and meet partial retention. There will not be any retention, if the unit is harvested using cable yarding and a moderate amount of retention, if harvest is completed using helicopter yarding. Maintain stilted root trees of any species, snags, trees with large branches (greater than 3") for nesting platforms and large diameter trees with heart rot for cavity nesting birds, if the helicopter yarding is used. Harvest activity will mimic natural vegetative patterns such as blowdown or disease pockets using helicopter yarding and mimic a landslide using cable yarding. Recreational and ferry/cruise ship passengers may notice harvest, but it should appear as a natural disturbance.

PRESCRIPTION DIRECTION:
Depending on which road option is chosen, the unit will be managed as an even-aged stand, if cable yarded or a two-aged stand, if helicopter yarded. Under the road option, this unit will be clearcut. Under the helicopter option, the unit is divided into several sections in order to implement harvest prescriptions in the following manner. Section A will be harvested by individual tree selection which will retain 30% of the basal area over this section. Section B will be harvested by individual tree selection which will retain 50% of the basal area over this section. Section C will be harvested by clearcut. Treatments in section A and B will use a variety of prescriptions. Retention should be as windfirm as possible. Regeneration of harvested areas will be naturally seeded by adjacent trees and seed trees from within the unit. Future stand treatments may involve limited thinning or sanitation to favor spruce, cedar and growth of trees with good form for timber. These treatments will also seek to maintain 10-30% of the trees as future snags and large trees for structural diversity. In order to achieve this, some areas within the unit may be left untreated, if the helicopter harvest method is used.

UNIT 30 – Helicopter Option – Alternatives 1 & 4



Proposed Roads

Class 1 Streams

Class 2 Streams

Class 3 Streams

★ Eagle Nest Tree

E Proposed Log Transfer Facility

Proposed cut prescriptions

Adjacent proposed units

Saltwater and Lakes

TTRA Buffers

Scale/ 4 inches = 1 mile

A Section

PR1 Prescription

King George Timber Sale Unit Number 31 In Alternative 1

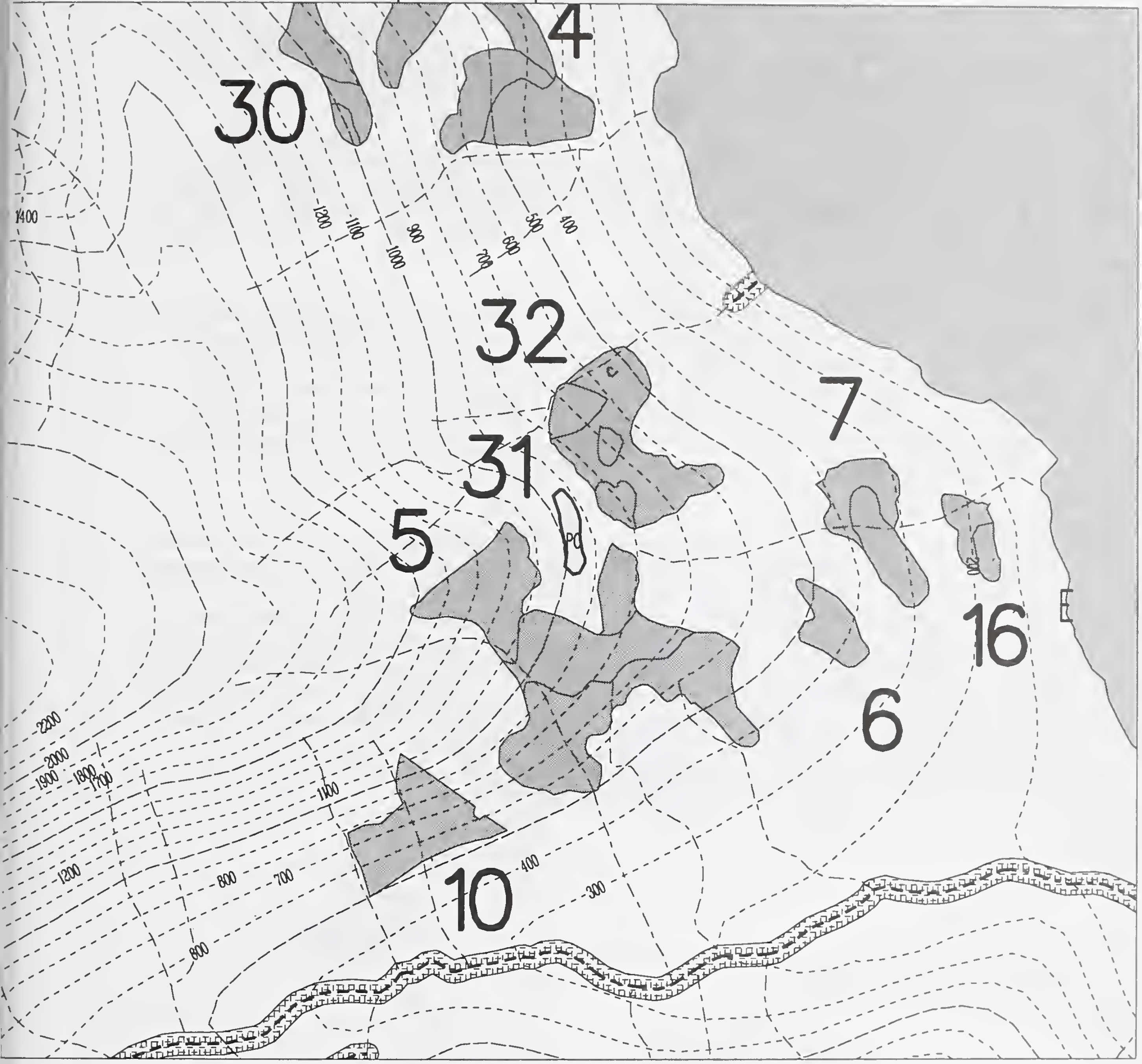
Compartment 156 VCU 462 Total Acres 2 Harvest Acres 2
Harvest method helicopter Volume Harvested 90 MBF

EXISTING CONDITION:
The unit is located in the Zimovia Face land unit and is visible from Zimovia Strait and Zimovia highway on Wrangell Island. There are no mapped streams within this unit. There is extensive porcupine activity and bole rot within the western hemlock. This unit is located within high deer winter range habitat.

DESIRED CONDITION:
The desired condition of this unit is to harvest timber over a 100 year rotation and meet partial retention. Harvest activity will mimic natural vegetative patterns, such as blowdown or disease pockets. There may be a texture change in the landscape as seen from Wrangell Island but most of the unit should not be noticeable to the casual observer. Recreational and ferry/cruise ship passengers may notice the opening, but it should appear as a natural disturbance pattern within the landscape.

PRESCRIPTION DIRECTION:
The objectives of this unit can best be met by even-aged management. The unit will be clearcut. Regeneration of this unit will be natural from adjacent trees surrounding the unit. Future stand treatments may involve limited thinning to favor spruce, cedar and growth of trees with good form for timber. Unit design will be a contour patch clearcut.

JNIT 31 - Helicopter Option - Alternative 1



Proposed Roads

Class 1 Streams

Class 2 Streams

Class 3 Streams

★ Eagle Nest Tree

E Proposed Log Transfer Facility

Proposed cut prescriptions

Adjacent proposed units

Saltwater and Lakes

TTRA Buffers

Scale/ 4 inches = 1 mile

A Section

PR1 Prescription

King George Timber Sale Unit Number 32 In Alternative 1

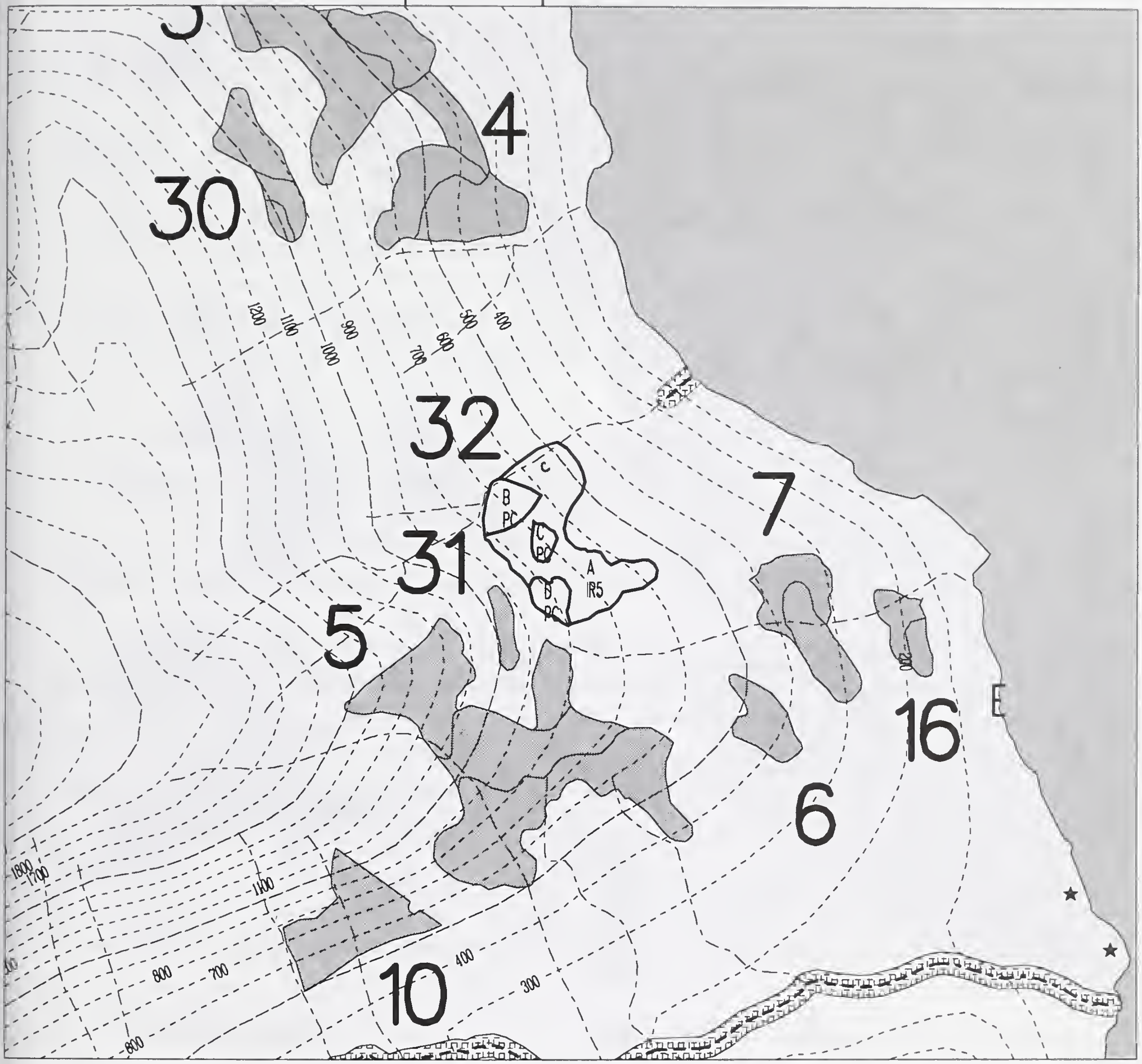
Compartment 156 VCU 462 Total Acres 27 Harvest Acres 27 Harvest method helicopter
Volume Harvested 689 MBF

EXISTING CONDITION:
The unit is located in the Zimovia Face land unit and is visible from Zimovia Strait, the Nemo campsites, residences along FH16 and Zimovia highway. There is one mapped stream within this unit. There is extensive porcupine activity and bole rot within the western hemlock. This unit and the area around it gets quite a bit of elk, deer and moose use.

DESIRED CONDITION:
The desired condition of this unit is to harvest timber over a 150 year rotation and meet partial retention. Harvest will maintain a moderate amount of retention through the unit, which will reduce fragmentation. Maintain stilted root trees of any species, snags, trees with large branches (greater than 3") for nesting platforms and large diameter trees with heart rot for cavity nesting birds. Maintain structural diversity within unit for wildlife hiding cover. Meet partial retention with harvest activity by mimicking natural vegetative patterns, such as blowdown or disease pockets. Recreational and ferry/cruise ship passengers may notice harvest, but it should appear as a natural disturbance, dispersed over the landscape.

PRESCRIPTION DIRECTION:
The objectives of this unit can best be met by uneven-aged management. The unit is divided into several sections in order to implement harvest prescriptions in the following manner. Section A will be harvested by individual tree selection which will retain 50% of the basal area over this section. Sections B, C & D will be harvested by group selection while retaining some seed trees of cedar and spruce, where possible. Retention should be as windfirm as possible, particularly adjacent to the stream. Regeneration of harvested areas will be naturally seeded by adjacent trees and seed trees from within the unit. Future stand treatments may involve limited thinning or sanitation to favor spruce, cedar and growth of trees with good form for timber. These treatments will also seek to maintain 10 % of the trees as future snags and large trees for structural diversity. In order to achieve this, some areas within the unit may be left untreated. Helicopter yarding, varying harvest prescriptions and irregular unit design should achieve partial retention in this highly visible and steep unit. The stream will be protected by clause 'c'.

UNIT 32 - Helicopter Option - Alternative 1



Proposed Roads

Class 1 Streams

Class 2 Streams

Class 3 Streams

★ Eagle Nest Tree

E Proposed Log Transfer Facility

Proposed cut prescriptions

Adjacent proposed units

Saltwater and Lakes

TTRA Buffers

Scale/ 4 inches = 1 mile

A Section

PR1 Prescription

KING GEORGE ROAD DESIGN CARDS

SEGMENT NO. 1			VCU: 462		
ROAD CLASS: COLLECTOR				SERVICE LEVEL: D	
ALTERNATIVE	1 & 6	2	3	4	5
MAINTENANCE LEVEL	N\A	2	2	2	1
LENGTH	N\A	2070 ft.	2070 ft.	2070 ft.	2070 ft.
# STREAM CROSSINGS - CLASS 1: -0			CLASS 2: -0		

Roads	Comments by: D. Barnett

Segment 1 begins at the LTF where a borrow source would need to be developed for 5000 cubic yards of rock. A larger borrow source would be developed 1\4 mi. from the LTF to continue the road. This segment is average road construction.

Timber /Silviculture	Comments by: R. Hojem/ J. Jordan

Locate sort yard within 1/2 mile of LTF, in scrub timber. Retain timber where possible for screening. Design additional turnouts to handle heavy traffic between sort yard and LTF. Maintain road access for at least 5 years after harvest for implementation of silvicultural activities.

Watershed/Fisheries	Comments by: J. Thompson/ D. Reed

No mappable streams cross this road segment. No concerns apart from sort yard and LTF erosion control. Important to maintain good crown shape of surface, cross drains, and ditchlines along 13.5% pitch down to LTF.

Soils/Geology	Comments by: J. deMontigny

Primarily deep organic soils (wetlands) along this road segment, with well drained mineral soils near the beach. Cut slopes should be stabilized to minimize soil erosion.

Wildlife	Comments by: S. Posner

This road bisects areas of old growth habitat and minimizes habitat effectiveness of the surrounding forest. Restricting access to non-motorized travel would benefit habitat values.

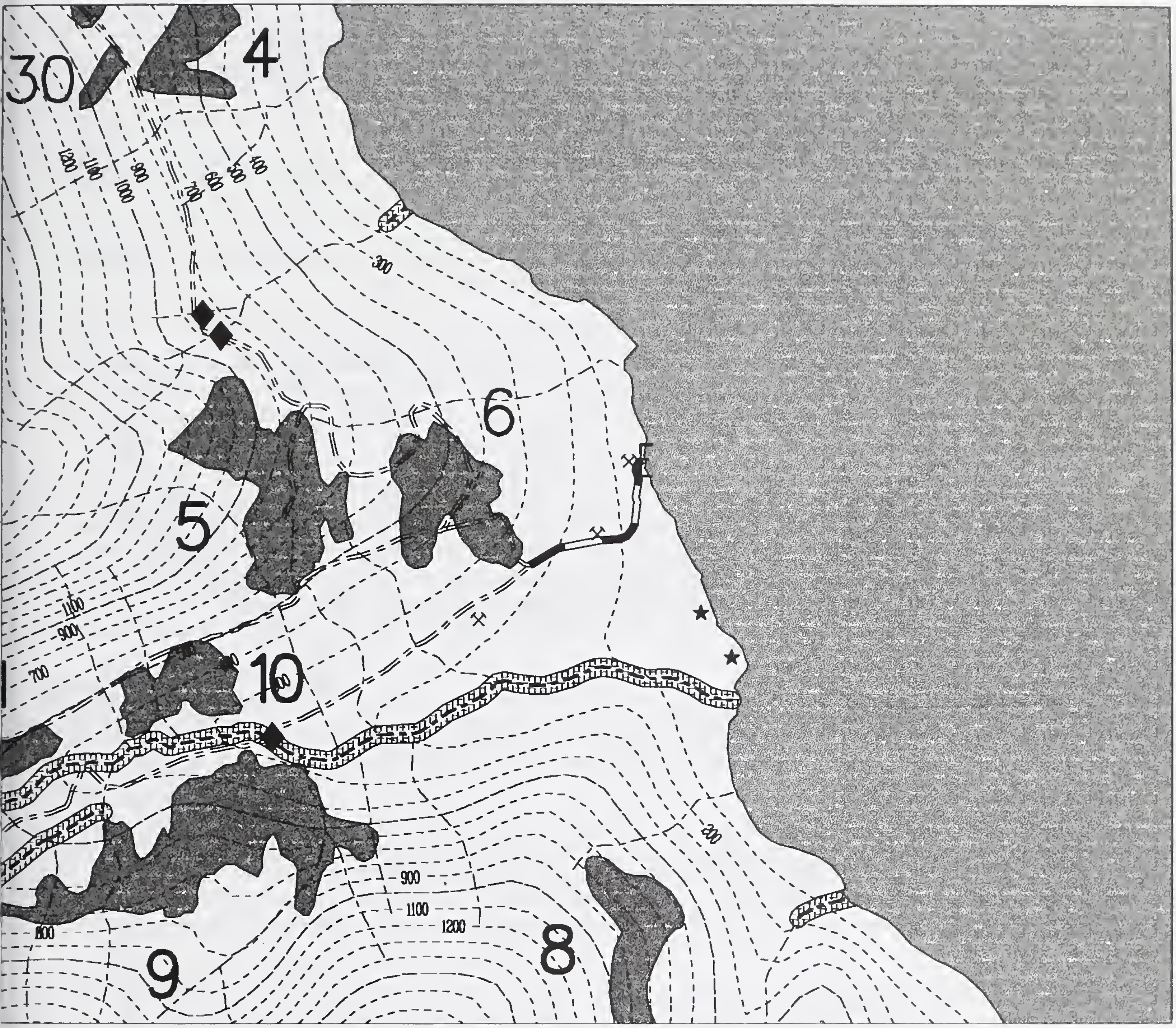
Visual/Recreation	Comments by: M. Mitchell/ D. Galla

Provides improved access for hiking, biking or motorized use to the central portions of the study area, including partial access to the pass to Kunk Lake. Keeping it open would favor motorized use while closure would benefit hikers and bikers. Minimize clearing widths. This segment is partially visible from Zimovia Strait.

Access Management	Comments by: IDT

The road would remain open under Alternatives 2, 3, and 4.
Under Alternative 5, the road would be closed to vehicle access after final harvest by water barring between the LTF and the Sort Yard.

ROAD SEGMENT 1



Proposed Road Segment

Adjacent proposed Road Segments

Class 1 Streams

Class 2 Streams

Class 3 Streams

Scale: 3 inches = 1 mile

Proposed cut units

Saltwater and Lakes

TTRA Buffers

Eagle Nest Tree

E Proposed Log Transfer Facility

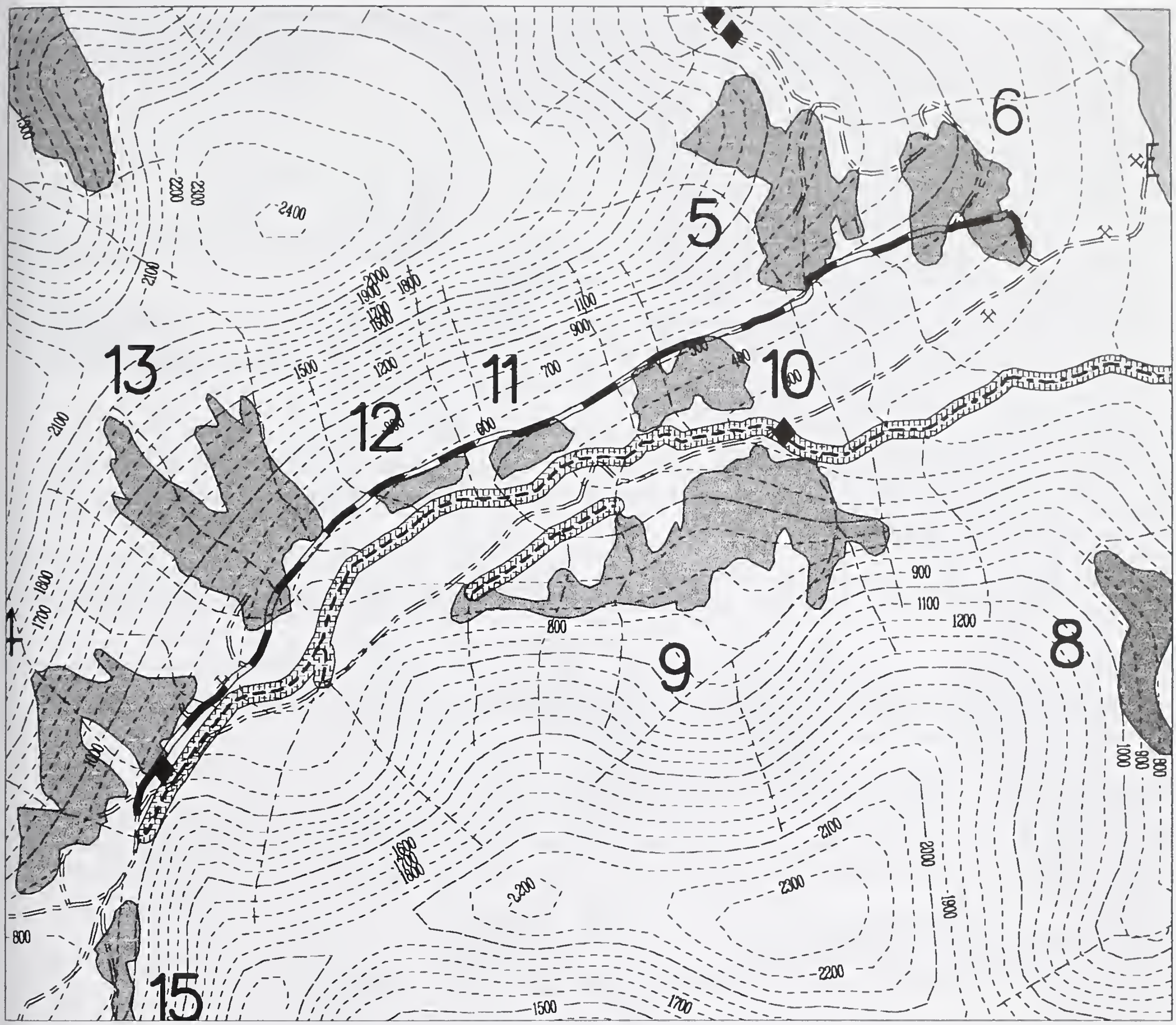
Proposed Rock Pit Site

Proposed Major Stream Crossing

KING GEORGE ROAD DESIGN CARDS

<table>
<tr><td colspan="3">SEGMENT NO. 2</td><td colspan="3">VCU: 462</td></tr>
<tr><td colspan="4">ROAD CLASS: COLLECTOR</td><td colspan="2">SERVICE LEVEL: D</td></tr>
<tr><td>ALTERNATIVE</td><td>1 & 6</td><td>2</td><td>3</td><td>4</td><td>5</td></tr>
<tr><td>MAINTENANCE LEVEL</td><td>N\A</td><td>2</td><td>2</td><td>2</td><td>1</td></tr>
<tr><td>LENGTH</td><td>N\A</td><td>3520 ft.</td><td>14,109 ft.</td><td>14,109 ft.</td><td>14,109 ft.</td></tr>
<tr><td colspan="3"># STREAM CROSSINGS - CLASS 1: -0</td><td colspan="3">CLASS 2: -6</td></tr>
<tr><td>Roads</td><td colspan="5">Comments by: D. Barnett</td></tr>
<tr><td colspan="6">Segment 2 is average road building. In some areas where the road cuts through alluvial sidehill riprap walls may be required to prevent sloughing. There is one hydro site which will required a 60” cmp or larger.</td></tr>
<tr><td>Timber/Silviculture</td><td colspan="5">Comments by: R. Hojem/ J. Jordan</td></tr>
<tr><td colspan="6">Keep road as high as possible on the hillslope. Unit 10 will require 2-3 landings. Units 11 and 12 are designed for mobile track yarder or shovel. Deck logs along low side of road. Units 13 and 14 will have landings established for downhill yarding. Keep road open for at least 5 years after sale for silvicultural management and small sales. Minimize road and road clearing widths to reduce blowdown along this road segment.</td></tr>
<tr><td>Watershed/Fisheries</td><td colspan="5">Comments by: J. Thompson/ D. Reed</td></tr>
<tr><td colspan="6">Report on file comparing road segments 2 and 9. Road crosses the footslope where several streams (including 6-8 unmapped channels) lose containment, resulting in small alluvial fans. Most streams are about 1 meter bankfull width. The alignment hovers near the transition between Class II and III. Favor minor adjustments upslope to achieve better stream containment at crossing sites, reduce Class II crossings, and provide better unit access for landing locations and yarding operations. Rock pits will require site specific erosion control and rehabilitation plans due to high stream frequency and proximity to fish habitat.</td></tr>
<tr><td>Soils/Geology</td><td colspan="5">Comments by: J. deMontigny</td></tr>
<tr><td colspan="6">The hillslope above the road has numerous deeply incised v-notches. Recent debris torrents have deposited material across the proposed road line. Prompt stabilization of cut and fill slopes is recommended to minimize surface erosion. Retaining wall may be needed to control surface ravel.</td></tr>
<tr><td>Wildlife</td><td colspan="5">Comments by: S. Posner</td></tr>
<tr><td colspan="6">This road bisects areas of old growth habitat and minimizes habitat effectiveness of the surrounding forest. The full length of this road also runs through one of the major large mammal travel corridors within the study area. The road may increase harvest of some game species and furbearers within the Honeymoon drainage. Restricting access to walk-in travel would benefit habitat values.</td></tr>
<tr><td>Visual/Recreation</td><td colspan="5">Comments by: M. Mitchell/ D. Galla</td></tr>
<tr><td colspan="6">Provides improved access for hiking, biking or motorized use to the central portions of the study area, including partial access to the pass to Kunk Lake and Bessie Peak area. Keeping it open would favor motorized use while closure would benefit hikers and bikers. Portions of this road will be visible for approximately 15 years through unit 6.</td></tr>
<tr><td>Access Management</td><td colspan="5">Comments by: IDT</td></tr>
<tr><td colspan="6">The road would remain open under Alternatives 2, 3, and 4.
Under Alternative 5, the road would be closed by water barring as needed to prevent vehicle passage.</td></tr>
</table>

ROAD SEGMENT 2



Proposed Road Segment

Adjacent proposed Road Segments

Class 1 Streams

Class 2 Streams

Class 3 Streams

Scale: 3 inches = 1 mile

Proposed cut units

Saltwater and Lakes

TTRA Buffers

★ Eagle Nest Tree

E Proposed Log Transfer Facility

Proposed Rock Pit Site

◆ Proposed Major Stream Crossing

KING GEORGE ROAD DESIGN CARDS

SEGMENT NO. 3			VCU: 462		
ROAD CLASS: LOCAL					SERVICE LEVEL: D
ALTERNATIVE	1 & 6	2	3	4	5
MAINTENANCE LEVEL	N\A	N\A	1	1	1
LENGTH	N\A	N\A	2500 ft	4170 ft.	9791 ft.
# STREAM CROSSINGS - CLASS 1: -0			CLASS 2: -0		

Roads	Comments by: D. Barnett

The first 1000 ft. is on moderately steep sideslopes, 40-60%. There are two major v notches which are about 30 ft. deep which will require at least a 60" cmp. Some areas may need riprap walls to prevent sloughing.

Timber/Silviculture	Comments by: R. Hojem/ J. Jordan

High location is good for uphill yarding. Deflection within units is not great. Location allows for shovel yarding most of Unit 6. Potential for future management between Units 4 and 5 if designed to meet visual objectives.

Watershed/Fisheries	Comments by: J. Thompson/ D. Reed

Good alignment across two large Class III streams as described above and an additional three smaller Class III streams. Road crosses two very wet slopes in vicinity north of Units 5 and 6 that will require extra cross-drainage. Fish habitat is greater than 1500' downstream from two of the class III crossings.

Soils/Geology	Comments by: J. deMontigny

Basil till is the dominant parent material along this stretch of road. Erosion control measures should be designed to control fine textured material.

Wildlife	Comments by: S. Posner

Improved access may increase harvest of some game species and furbearers in this fairly high to medium value ungulate winter range. Restricting access to walk-in travel would benefit habitat values.

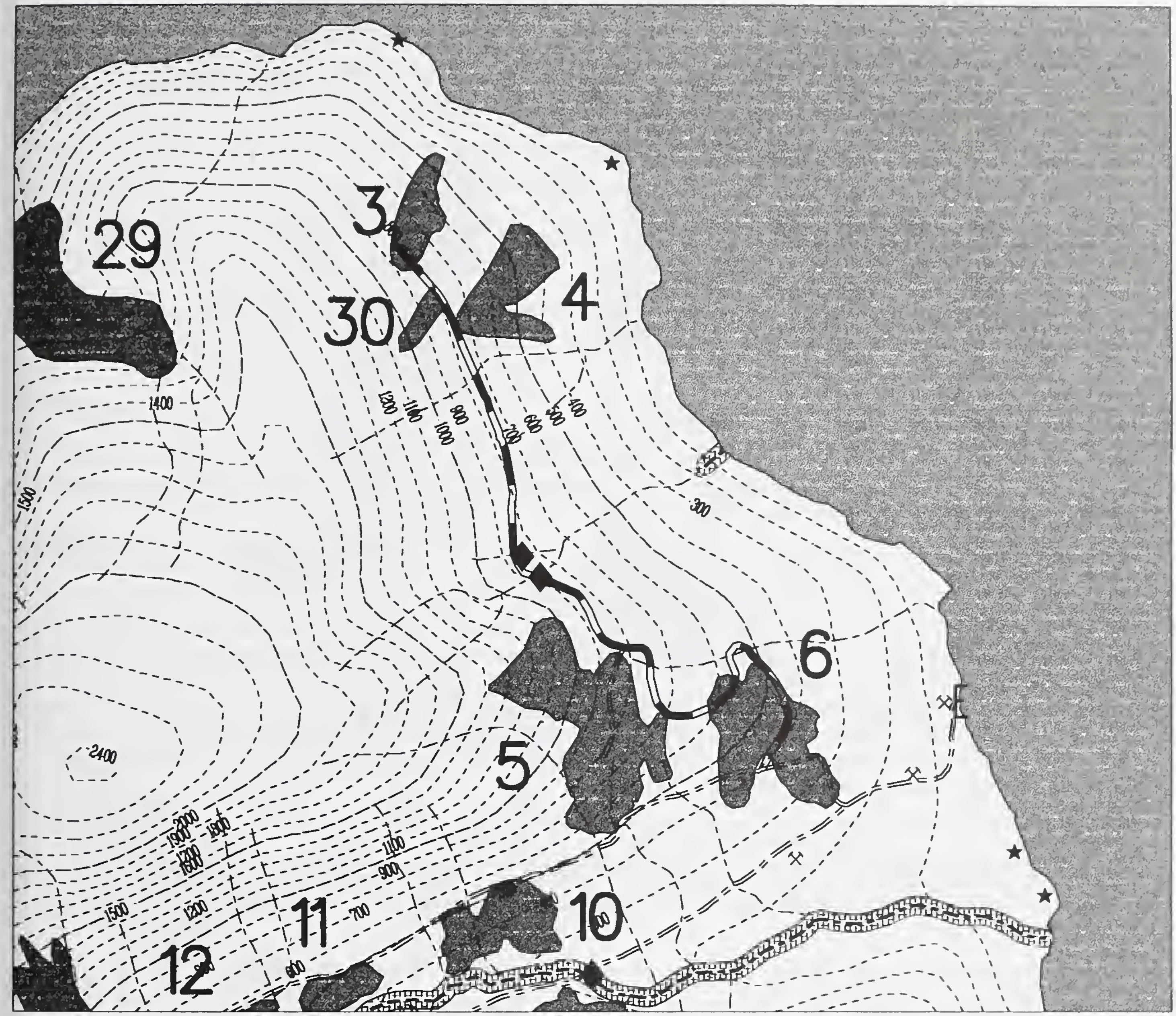
Visual/Recreation	Comments by: M. Mitchell/ D. Galla

Parts of the road, particularly the last 1 mile and segments that pass through harvest units would be visible from Wrangell Island and Zimovia Strait for a period of up to 15 years. The road may provide some access for hiking, biking, or motorized use but there is little recreation attraction other than dispersed hunting. Prevent continuous alder establishment along road right away through grass seeding.

Access Management	Comments by: IDT

This road segment will be closed under Alternatives 3, 4, and 5 by water barring at the southern boundary of unit 6.

ROAD SEGMENT 3



Proposed Road Segment

Adjacent proposed Road Segments

Class 1 Streams

Class 2 Streams

Class 3 Streams

Scale: 3 inches = 1 mile

Proposed cut units

Saltwater and Lakes

TTRA Buffers

★ Eagle Nest Tree

E Proposed Log Transfer Facility

⚒ Proposed Rock Pit Site

◆ Proposed Major Stream Crossing

KING GEORGE ROAD DESIGN CARDS

SEGMENT NO. 4			VCU: 462		
ROAD CLASS: LOCAL				SERVICE LEVEL: D	
ALTERNATIVE	1 & 6	2	3	4	5
MAINTENANCE LEVEL	N\A	2	2	N\A	1
LENGTH	N\A	6835 ft.	6835 ft.	N\A	6835 ft.
# STREAM CROSSINGS - CLASS 1: -1			CLASS 2: -0		

Roads	Comments by: D. Barnett

There are three major hydro sites in this section which will require a 60" or larger cmp. King George Creek crossing is Class I. The section of road coming through the pass from Honeymoon to King George, about 400 ft. in length, is on 60-80% sideslopes and may require full bench with end haul.

Timber/Silviculture	Comments by: R. Hojem/ J. Jordan

Recommend mobile yarder for northern tip of Unit 15 (downhill yarding). Yard east portion of Unit 17 uphill to temporary road. Maintain access until harvest along road segments 6, 7, and 8 is complete. Maintain at least bike access to units west of upper King George Creek for silvicultural activities.

Watershed/Fisheries	Comments by: J. Thompson/ D. Reed

Alignment along north side of Unit 15 needs minor adjustment to cross unmapped Class III stream. Three 1-meter wide stream crossings in Unit 17; keep road as high as possible. Designate stable end haul site away from streams. Crossing south end of Unit 17 needs design work. Waterfalls up and downstream of crossing, large debris and bedload transport make this site high risk for structure stability and maintenance. I've reviewed three Upper King George Creek crossing sites; this one minimizes tributary crossings in approach while providing a relatively stable floodplain crossing. All structures (and structure maintenance plans) should consider the fact that beavers are very active in the vicinity of King George Creek and its tributaries and approaches to bridge crossing will encroach on the floodplain. Greater than average risk associated with plugging and failure of V-notch crossing at southern boundary of unit 17.

Soils/Geology	Comments by: J. deMontigny

The segment of road with 60-80% slopes has moderately well drained soils. Slope buttressing may be necessary at the v-notch crossings. Soils in the floodplain near the stream crossing are developed in deep sand deposits; soils are somewhat poorly to poorly drained.

Wildlife	Comments by: S. Posner

This road segment crosses into the King George watershed which contains most of the retained old growth designated under this project. Wildlife values are high in this watershed. The pass that this road goes through was identified in issue 4 as a "pinch point" in an important travel corridor. Restricting access to walk-in use would benefit wildlife conservation values.

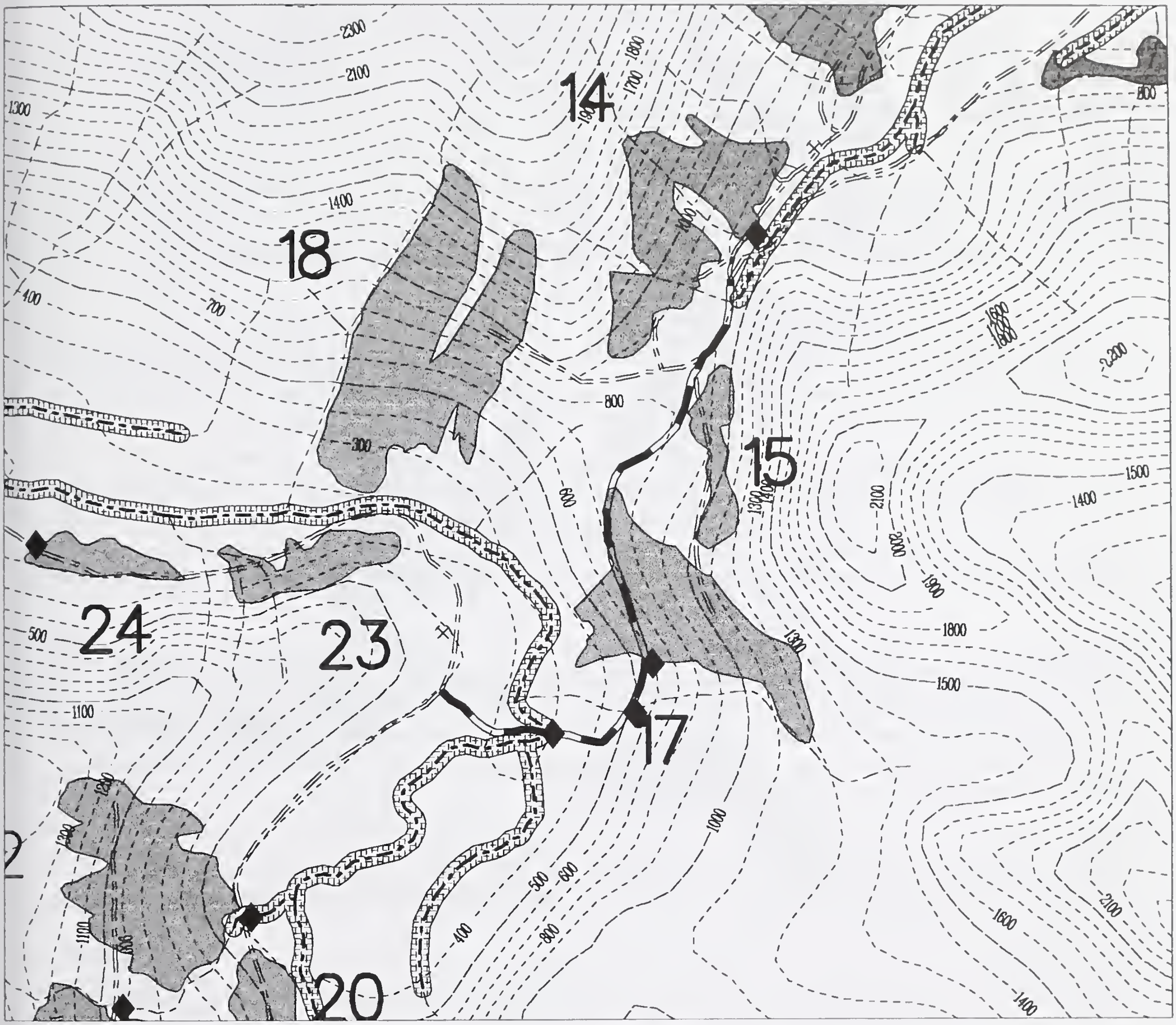
Visual/Recreation	Comments by: M. Mitchell/ D. Galla

Portions of this road that cross unit 17 would be seen in the background from Stikine Strait. The road would provide access to hikers, bikers and motorized use across King George Creek and into the upper basin. If closed to motorized use at the creek, the road would provide access for fishing.

Access Management	Comments by: IDT

Under Alternatives 2 and 3, the road would remain open.
Under Alternative 5 the road would be closed by water barring to prevent vehicle passage.

ROAD SEGMENT 4



Proposed Road Segment

Adjacent proposed Road Segments

Class 1 Streams

Class 2 Streams

Class 3 Streams

Scale: 3 inches = 1 mile

Proposed cut units

Saltwater and Lakes

TTRA Buffers

★ Eagle Nest Tree

E Proposed Log Transfer Facility

Proposed Rock Pit Site

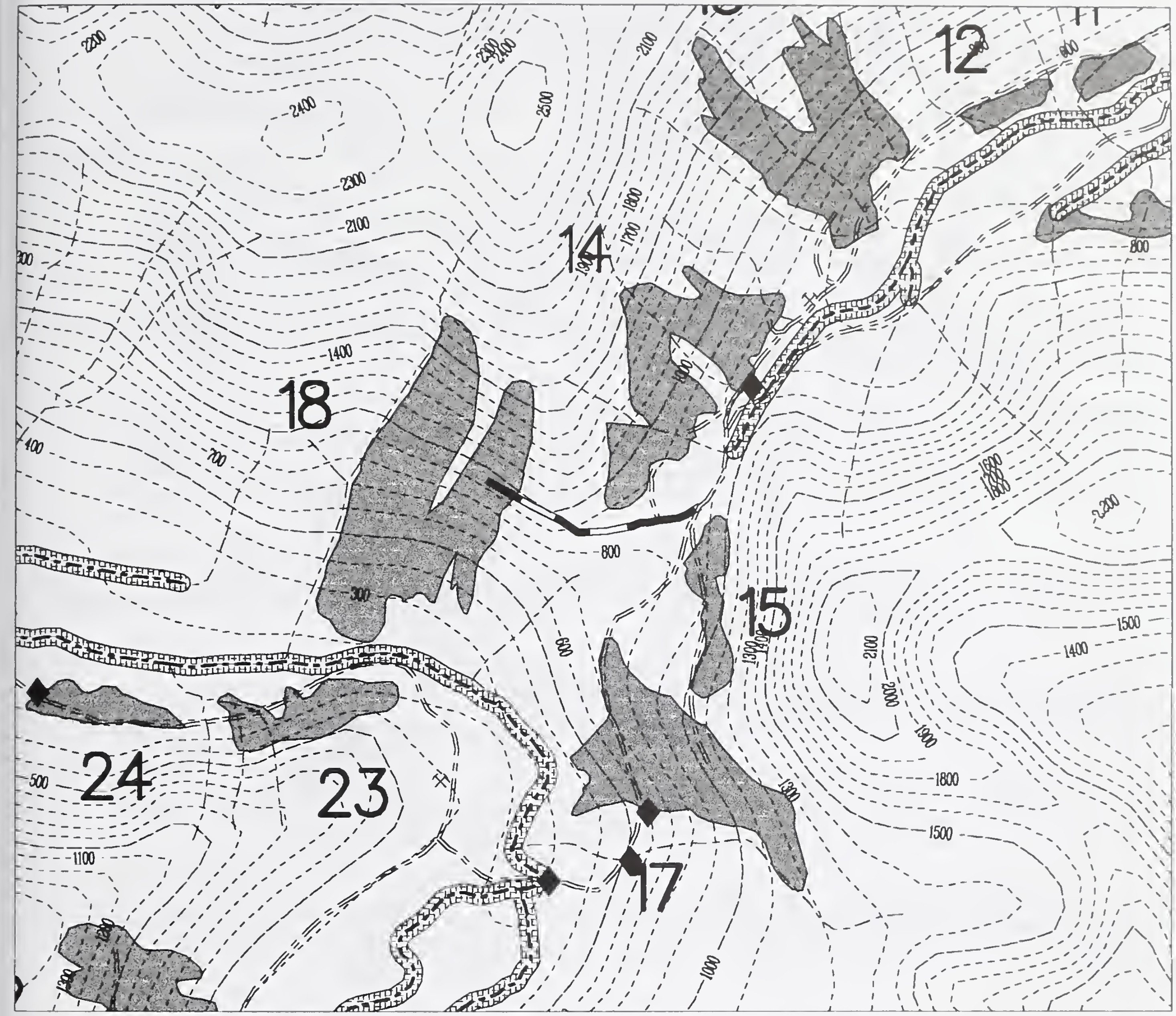
◆ Proposed Major Stream Crossing

KING GEORGE ROAD DESIGN CARDS

SEGMENT NO. 5			VCU: 462		
ROAD CLASS: LOCAL				SERVICE LEVEL: D	
ALTERNATIVE	1 & 6	2	3	4	5
MAINTENANCE LEVEL	N\A	1	N\A	N\A	1
LENGTH	N\A	2600 ft.	N\A	N\A	2600 ft.
# STREAM CROSSINGS - CLASS 1: -0			CLASS 2: -0		

Roads	Comments by: D. Barnett
This section is on 40% and less sideslopes for the first half then the sideslopes steepen to 40-60%. It provides access to unit 18.	
Timber/Silviculture	**Comments by: R. Hojem/ J. Jordan**
Develop skyline landing at end of road (first landing in Unit 18). Road will also be used for helicopter landing of upper half of Unit 18 (IR5 prescription). A potential future unit is located between Units 14 and 18. Road should not be extended beyond Unit 18 due to steep sideslopes and very large v-notch west of Unit 18.	
Watershed/Fisheries	**Comments by: J. Thompson/ D. Reed**
Class III stream at Unit 18 west boundary is road-stopper. Road crosses two unmapped Class III streams (Sta 26+10 and Sta 30+45). At Sta. 27+55 there is about 50 feet of 90% slope just above where a Class III stream becomes mappable. Consider ending the specified road in the eastern portion of the unit and extending temporary road toward the west boundary, but this section could be a problem for temporary road construction. Class I (beaver pond) habitat is located greater than 1700' directly downslope.	
Soils/Geology	**Comments by: J. deMontigny**
Soils are somewhat poorly drained with basal till parent material along this road segment. The first section of road has moderate slopes. At the unit boundary, the road crosses an old landslide tract. Within the unit, the road is located on a bench, with steep slopes below the road. A short section of road has 60% + slopes where it crosses a small stream. The steep slopes with evidence of past failure indicate that there is a high risk of slope failure. There is a high chance that sediment would go directly into King George creek if hillslope failure occurs in Unit 18.	
Wildlife	**Comments by: S. Posner**
Improved access to the south-facing slope of the King George watershed may increase hunting pressure and reduce effectiveness of designated old growth habitat areas further west. This road crosses an important travel corridor. Restricting access to walk-in use would benefit wildlife conservation values.	
Visual/Recreation	**Comments by: M. Mitchell/ D. Galla**
This road would provide limited additional access for hiking, biking or motorized use except for dispersed hunting. This road segment may be visible in the background from Bessie Peak.	
Access Management	**Comments by: IDT**
This segment will be closed where it takes off from segment 2, by water barring.	

ROAD SEGMENT 5



Proposed Road Segment

Adjacent proposed Road Segments

Class 1 Streams

Class 2 Streams

Class 3 Streams

Scale: 3 inches = 1 mile

Proposed cut units

Saltwater and Lakes

TTRA Buffers

★ Eagle Nest Tree

E Proposed Log Transfer Facility

Proposed Rock Pit Site

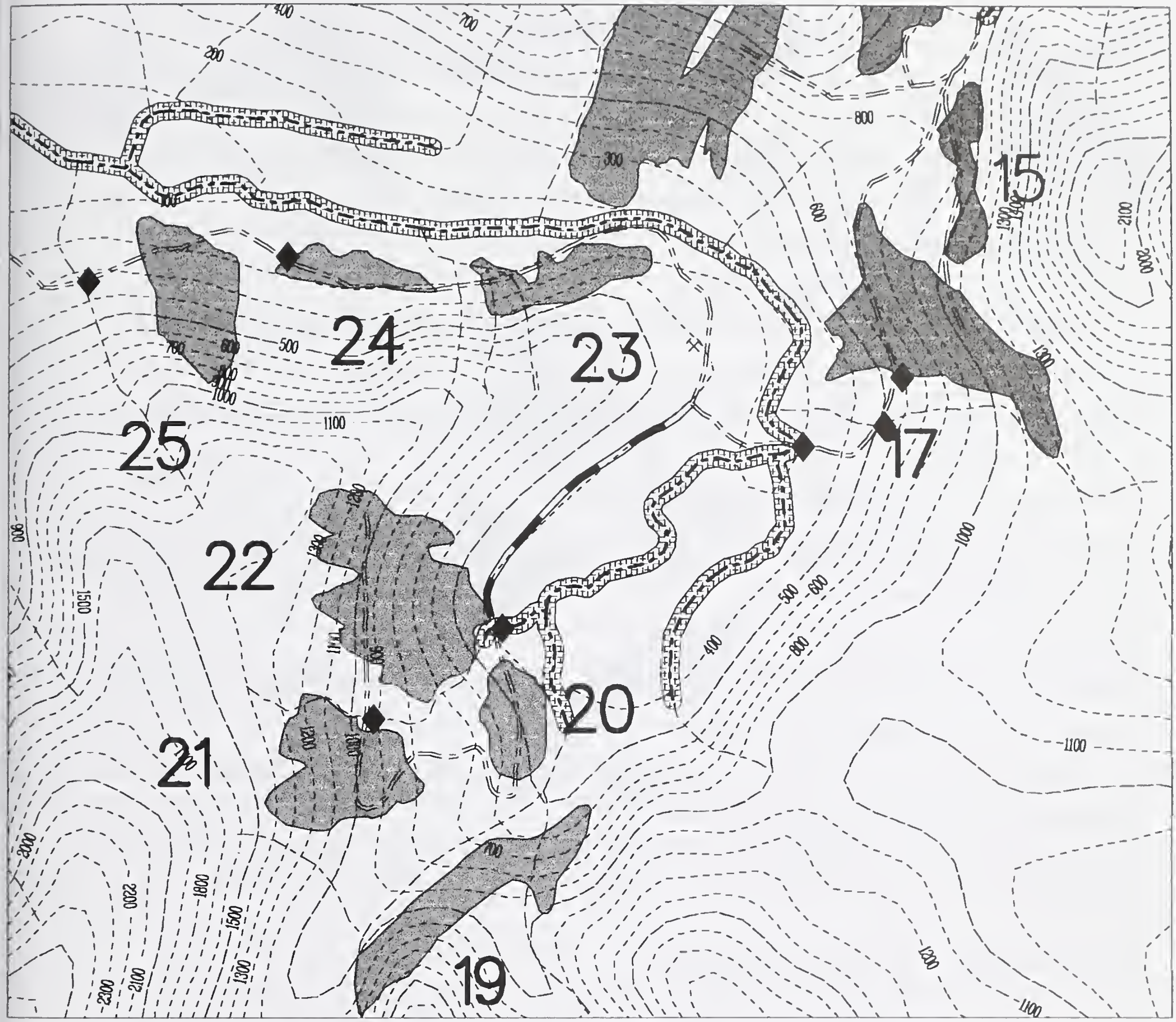
◆ Proposed Major Stream Crossing

KING GEORGE ROAD DESIGN CARDS

SEGMENT NO. 6			VCU: 462		
ROAD CLASS: COLLECTOR				SERVICE LEVEL: D	
ALTERNATIVE	1 & 6	2	3	4	5
MAINTENANCE LEVEL	N\A	1	2	N\A	1
LENGTH	N\A	3960 ft.	3960 ft.	N\A	3960 ft.
# STREAM CROSSINGS - CLASS 1: -0			CLASS 2: -0		

Roads	Comments by: D. Barnett
This segment is typical construction on flat sideslopes.	
Timber/Silviculture	Comments by: R. Hojem/ J. Jordan
Keep road as high on slope as possible. Maintain road for five years after harvest of Units 19-22 to facilitate silviculture needs and salvage if needed. Move upslope in lower east end of Unit 22.	
Watershed/Fisheries	Comments by: J. Thompson/ D. Reed
Favor alignment as high on slope as reasonable to access lower portion of Unit 22. Road crosses very wet slope east of Unit 22 and will require extra cross drainage. Several unmapped Class III streams at east boundary of Unit 22. Minor upslope adjustment will achieve better stream containment at crossings and better unit access. Maintain integrity of existing beaver pond(s).	
Soils/Geology	Comments by: J. deMontigny
No special concerns. Revegetation for erosion control should be completed in a timely manner. Numerous choris bog orchids, a sensitive plant, were located along this road segment.	
Wildlife	Comments by: S. Posner
This road bisects areas of old growth habitat. Improved access may increase harvest of some large game species and furbearers. Restricting access to walk-in use would benefit using the travel corridor between Kunk Lake and the King George drainage.	
Visual/Recreation	Comments by: M. Mitchell/ D. Galla
The road could provide access to hikers, bikers and motorized use into the upper King George basin. Parts of the road, particularly the segments that pass through harvest units will be visible by hikers from Bessie Peak.	
Access Management	Comments by: IDT
This road segment will remain open under Alternative 3 and will be closed under Alternatives 2 and 5 by placing a gate or some other type of closure at the bridge that crosses King George Creek, or by blocking the road near the pass (by unit 15) with large boulders .	

ROAD SEGMENT 6



Proposed Road Segment

Adjacent proposed Road Segments

Class 1 Streams

Class 2 Streams

Class 3 Streams

Scale: 3 inches = 1 mile

Proposed cut units

Saltwater and Lakes

TTRA Buffers

★ Eagle Nest Tree

E Proposed Log Transfer Facility

Proposed Rock Pit Site

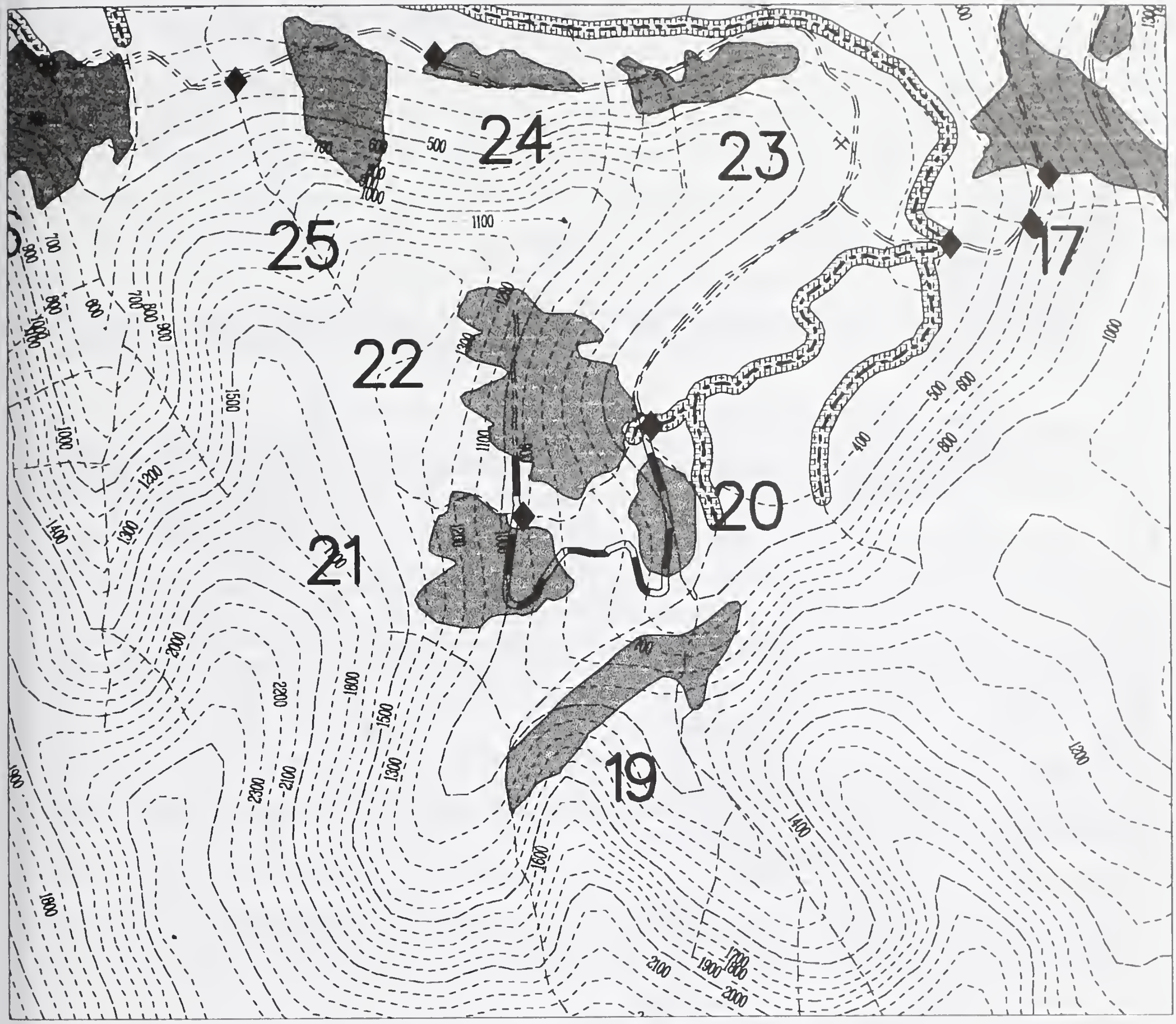
◆ Proposed Major Stream Crossing

KING GEORGE ROAD DESIGN CARDS

SEGMENT NO. 7			VCU: 462		
ROAD CLASS: LOCAL				SERVICE LEVEL: D	
ALTERNATIVE	1 & 6	2	3	4	5
MAINTENANCE LEVEL	N\A	1	1	N\A	1
LENGTH	N\A	5280 ft.	5280 ft.	N\A	5280 ft.
# STREAM CROSSINGS - CLASS 1: -0			CLASS 2: -4		

Roads	Comments by: D. Barnett
This segment is typical construction on 20-40% sideslopes. There are 2 hydro sites that will require 60" cmp or larger.	
Timber/Silviculture	Comments by: R. Hojem/ J. Jordan
High road location in Unit 22 facilitates uphill skyline yarding. Need to push switchback south of Unit 21 to gain elevation within Unit 21. Fly helicopter volume from Unit 19 to landings in Units 20 and 21.	
Watershed/Fisheries	Comments by: J. Thompson/ D. Reed
See segment 6 comments. Favor minor upslope adjustment at east Unit 22 boundary to minimize water quality impacts and culvert maintenance risks. No mappable streams cross the road through Units 20 and 21. Road location through upper Unit 22 minimizes stream crossings (unmapped Class III streams). Recommend slight upstream adjustment of lower hydro site.	
Soils/Geology	Comments by: J. deMontigny
No special concerns however, stability may be a problem where road crosses alluvial fans. completed in a timely manner.	
Wildlife	Comments by: S. Posner
This road bisects areas of old growth habitat. Improved access may increase harvest of some large game species and furbearers.	
Visual/Recreation	Comments by: M. Mitchell/ D. Galla
The road could provide limited access to hikers, bikers and motorized use into the upper King George basin but there is no recreational attraction. Parts of the road, particularly the segments that pass through harvest units will be visible by hikers from Bessie Peak.	
Access Management	Comments by: IDT
This road segment will be closed under Alternatives 2, 3, and 5 by removing major drainage structures within the segment.	

ROAD SEGMENT 7



Proposed Road Segment

Adjacent proposed Road Segments

Class 1 Streams

Class 2 Streams

Class 3 Streams

Scale: 3 inches = 1 mile

Proposed cut units

Saltwater and Lakes

TTRA Buffers

Eagle Nest Tree

E Proposed Log Transfer Facility

Proposed Rock Pit Site

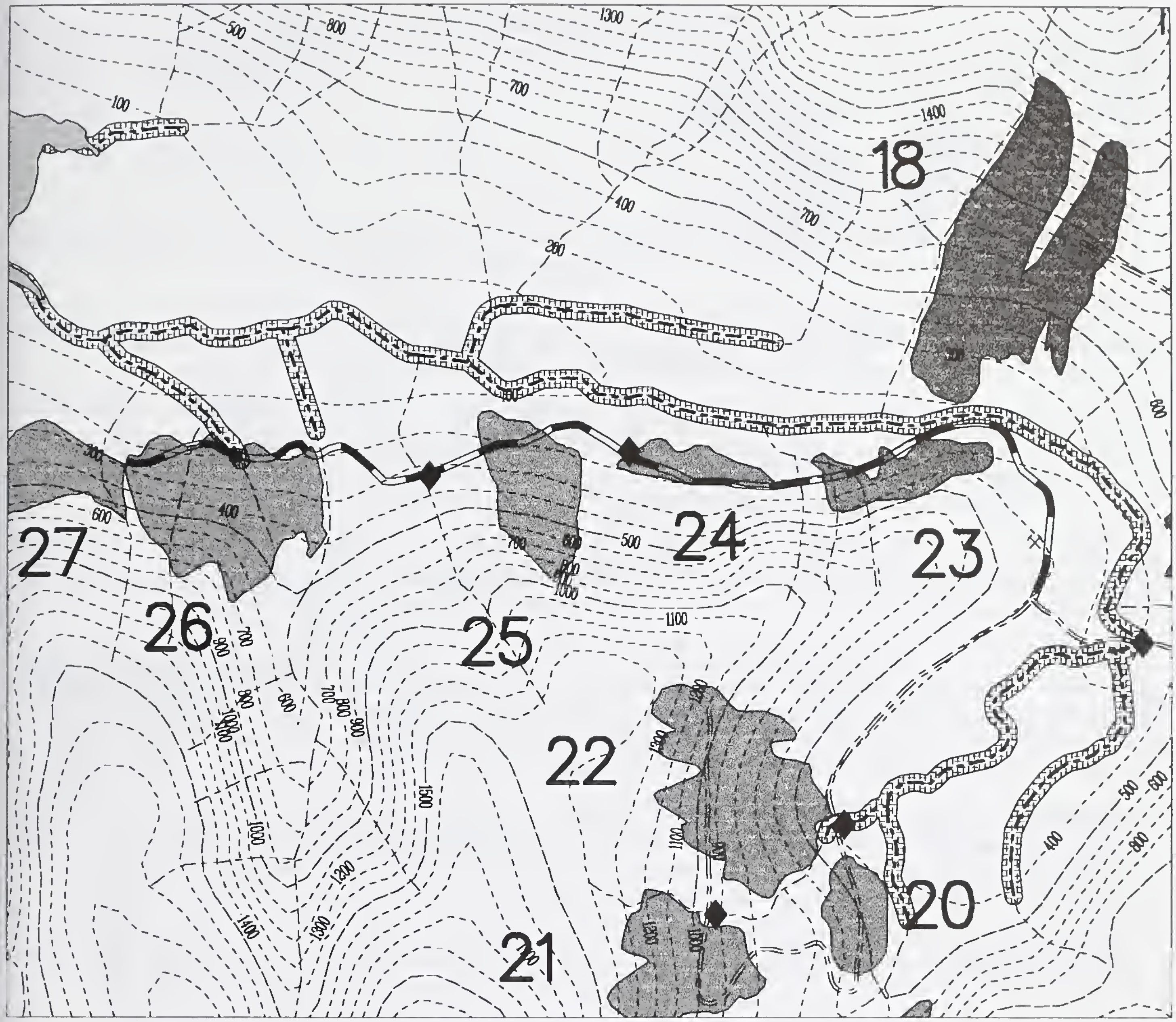
Proposed Major Stream Crossing

KING GEORGE ROAD DESIGN CARDS

SEGMENT NO. 8			VCU: 462		
ROAD CLASS: COLLECTOR				SERVICE LEVEL: D	
ALTERNATIVE	1 & 6	2	3	4	5
MAINTENANCE LEVEL	N\A	1	N\A	N\A	1
LENGTH	N\A	12,870 ft.	N\A	N\A·	12,870 ft.
# STREAM CROSSINGS - CLASS 1: -0			CLASS 2: -4		

Roads	Comments by: D. Barnett
There are two hydro sites in this segment which will need 60" cmp or larger. Construction is typical except at the first site where 300 feet of controlled blasting and end haul may be required. Some end haul may be needed in the areas where the road comes close to King George Creek.	
Timber/Silviculture	Comments by: R. Hojem/ J. Jordan
Locate road to facilitate both uphill and downhill yarding. Maintain access for silvicultural needs following harvest for at least 5 years. Minimize road and road clearing widths to reduce blowdown along this road segment.	
Watershed/Fisheries	Comments by: J. Thompson/ D. Reed
Watch for unstable sand deposits in vicinity of Unit 24 which will require site-specific erosion control plan. Road crosses several small Class III streams. Hydro site #1 appears to be a debris avalanche/stream depositional area between Units 24 and 25. Hydro site between Units 25 and 26 is high risk for structure stability and maintenance. This stream has large debris and bedload transport with a troublesome approach on west side (out of notch). Blasting near creek will require site-specific plan with contingencies for overshot. The class II fish habitat is less than 200' downstream. The class I habitat is greater than 1000' downstream.	
Soils/Geology	Comments by: J. deMontigny
Deep stratified sand deposits, as mentioned above, should receive immediate stabilization. Encourage alder regeneration along road for wildlife cover, diversity and enhanced productivity.	
Wildlife	Comments by: S. Posner
This road bisects areas of old growth habitat. Improved access to the lower King George watershed may increase hunting pressure and reduce the effectiveness of this designated old growth habitat area. Restricting access to walk-in use would benefit wildlife conservation values.	
Visual/Recreation	Comments by: M. Mitchell/ D. Galla
A portion of this road segment may be visible from Stikine Strait. The road would provide access to hikers, bikers and motorized use across King George Creek and into the lower King George drainage.	
Access Management	Comments by: IDT
This road segment will be closed under Alternatives 2 and 5 by placing a gate or some other type of closure at the bridge that crosses King George Creek, or by blocking the road near the pass (by unit 15) with large boulders.	

ROAD SEGMENT 8



Proposed Road Segment

Adjacent proposed Road Segments

Class 1 Streams

Class 2 Streams

Class 3 Streams

Scale: 3 inches = 1 mile

Proposed cut units

Saltwater and Lakes

TTRA Buffers

Eagle Nest Tree

Proposed Log Transfer Facility

Proposed Rock Pit Site

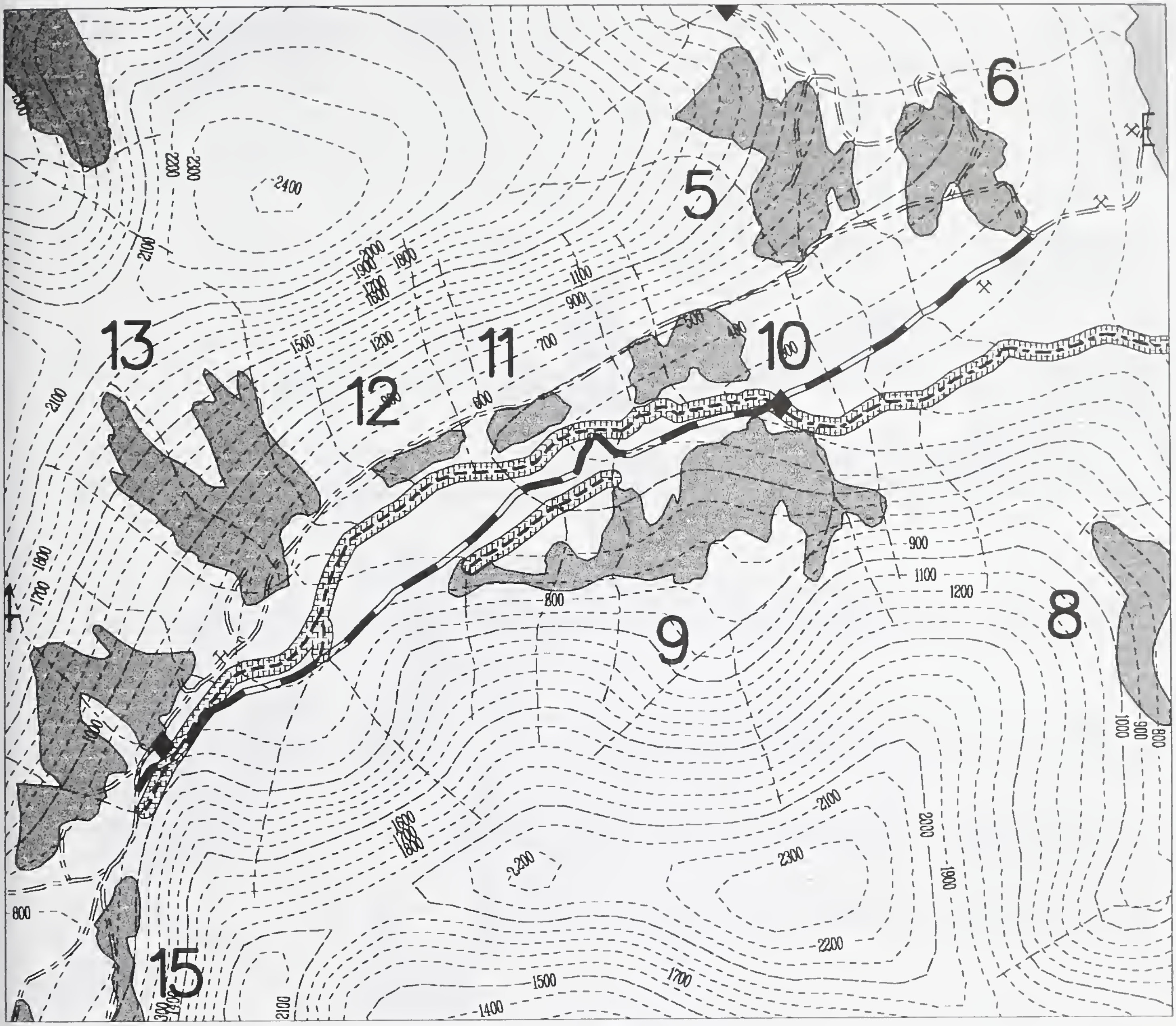
Proposed Major Stream Crossing

KING GEORGE ROAD DESIGN CARDS

SEGMENT NO. 9			VCU: 462		
ROAD CLASS: COLLECTOR				SERVICE LEVEL: D	
ALTERNATIVE	1 & 6	2	3	4	5
MAINTENANCE LEVEL	N\A	2	N\A	N\A	N\A
LENGTH	N\A	12,998 ft.	N\A	N\A	N\A
# STREAM CROSSINGS - CLASS 1: -0			CLASS 2: -6		

Roads	Comments by: D. Barnett
This section contains one hydro site which will need a 60" cmp or larger. It is easy construction as the road follows the muskegs up the valley. This will increase the cost because of the extra rock needed for subsidence.	
Timber/Silviculture	Comments by: R. Hojem/ J. Jordan
This road segment could be used to access Unit 9 with a cable system, rather than helicopter. No other potential harvest exists along this road. Maintain road access for at least 5 years for silvicultural activities.	
Watershed/Fisheries	Comments by: J. Thompson/ D. Reed
Favor minor adjustment at some crossings to achieve better stream containment. See report comparing Segments 2 and 9. Class II crossings lower down (and mainstem Honeymoon crossing) have good bedrock control. Proper vertical alignment is needed at bridge approaches to minimize direct sedimentation from road surface erosion.	
Soils/Geology	Comments by: J. deMontigny
This road crosses sedge muskeg and forested/sedge muskegs. Deep organic soils will be common. No special erosion control measures. Culverts should be placed in a way that avoids restricting the flow of subsurface water.	
Wildlife	Comments by: S. Posner
Canadian Geese and other birds use this muskeg complex that this road segment will bisect. Improved access into the head of Honeymoon Creek may increase hunting pressure of some game species, birds and furbearers. This road follows an important travel corridor, with a "pinch point" at the west end of the road. Restricting access to walk-in travel would benefit habitat conservation values. Keeping the road open may enhance hunting opportunities.	
Visual/Recreation	Comments by: M. Mitchell/ D. Galla
Provides improved access for hiking, biking or motorized use to the central portions of the study area, including partial access to Kunk Lake. Keeping it open would favor motorized use while closure would benefit hikers and bikers. This segment goes through an extensive muskeg complex and view should be spectacular.	
Access Management	Comments by: IDT
This road segment is only in Alternative 2 and it will remain open after harvest.	

ROAD SEGMENT 9



Proposed Road Segment

Adjacent proposed Road Segments

Class 1 Streams

Class 2 Streams

Class 3 Streams

Scale: 3 inches = 1 mile

Proposed cut units

Saltwater and Lakes

TTRA Buffers

Eagle Nest Tree

E Proposed Log Transfer Facility

Proposed Rock Pit Site

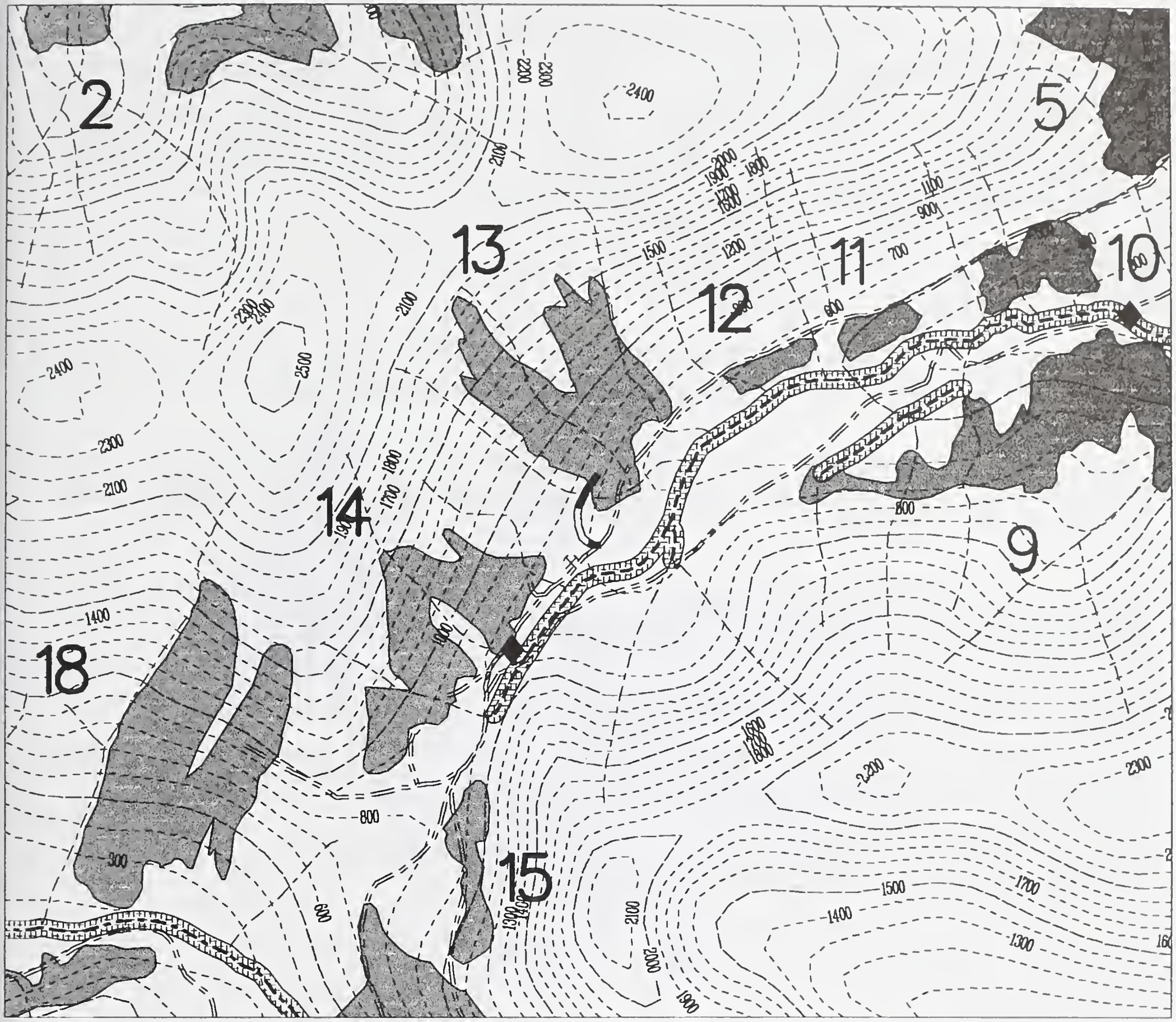
Proposed Major Stream Crossing

KING GEORGE ROAD DESIGN CARDS

SEGMENT NO. 13			VCU: 462		
ROAD CLASS: COLLECTOR				SERVICE LEVEL: D	
ALTERNATIVE	1 & 6	2	3	4	5
MAINTENANCE LEVEL	N\A	Temporary	Temporary	Temporary	Temporary
LENGTH	N\A	1000 ft.	1000 ft.	1000 ft.	1000 ft.
# STREAM CROSSINGS - CLASS 1: -0			CLASS 2: -0		

Roads	Comments by: D. Barnett
No comments.	
Timber /Silviculture	Comments by: R. Hojem/ J. Jordan
Locate this segment to maximize cable yarding and allow for landing zones for helicopter yarding.	
Watershed/Fisheries	Comments by: J. Thompson/ D. Reed
If possible minimize spur roads by improving specified road alignment uphill. Class III crossing is greater than 800' from class II fish habitat.	
Soils/Geology	Comments by: J. deMontigny
Remove overlay rock from wetlands and reuse. Reclaim (revegetate) to reestablish site productivity using native species.	
Wildlife	Comments by: S. Posner
Seeding temporary roads to native grass and forb species that are palatable to elk would benefit wildlife.	
Visual/Recreation	Comments by: M. Mitchell/ D. Galla
No recreation value. This short road segment is seen from Bessie Peak by hikers.	
Access Management	Comments by: IDT
This temporary road will be closed after harvest by water barring as needed.	

ROAD SEGMENT 13



Proposed Road Segment

Adjacent proposed Road Segments

Class 1 Streams

Class 2 Streams

Class 3 Streams

Scale: 3 inches = 1 mile

Proposed cut units

Saltwater and Lakes

TTRA Buffers

★ Eagle Nest Tree

E Proposed Log Transfer Facility

Proposed Rock Pit Site

◆ Proposed Major Stream Crossing

KING GEORGE ROAD DESIGN CARDS

SEGMENT NO. 14			VCU: 462		
ROAD CLASS: COLLECTOR				SERVICE LEVEL: D	
ALTERNATIVE	1 & 6	2	3	4	5
MAINTENANCE LEVEL	N\A	Temporary	Temporary	Temporary	Temporary
LENGTH	N\A	1100 ft.	1100 ft.	1100 ft.	1100 ft.
# STREAM CROSSINGS - CLASS 1: -0			CLASS 2: -0		

Roads	Comments by: D. Barnett
No comments.	

Timber /Silviculture	Comments by: R. Hojem/ J. Jordan
Locate this segment to maximize cable yarding and allow for landing zones for helicopter yarding.	

Watershed/Fisheries	Comments by: J. Thompson/ D. Reed
If possible minimize spur road construction by favoring uphill adjustment of specified road. Spurs are separated from fish habitat by distances exceeding 100'.	

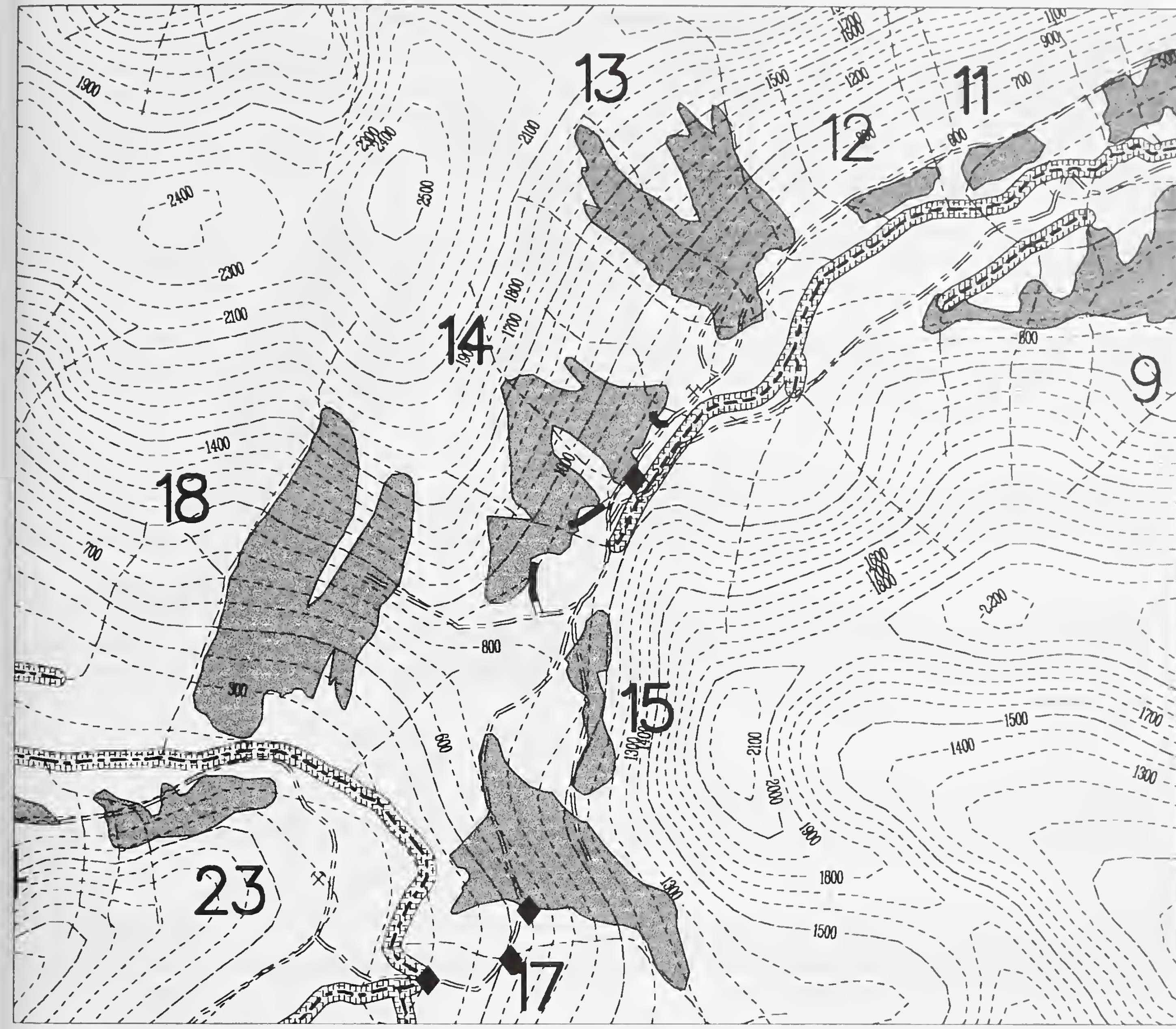
Soils/Geology	Comments by: J. deMontigny
Remove overlay rock from wetlands and reuse to the extent practicable. Reestablish native vegetation.	

Wildlife	Comments by: S. Posner
Seeding temporary roads to native grass and forb species that are palatable to elk would be beneficial.	

Visual/Recreation	Comments by: M. Mitchell/ D. Galla
No recreation value. This short road segment may be visible from Bessie Peak by hikers.	

Access Management	Comments by: IDT
This temporary road will be closed after harvest by water barring as needed.	

ROAD SEGMENT 14



Proposed Road Segment

Adjacent proposed Road Segments

Class 1 Streams

Class 2 Streams

Class 3 Streams

Scale: 3 inches = 1 mile

Proposed cut units

Saltwater and Lakes

TTRA Buffers

★ Eagle Nest Tree

E Proposed Log Transfer Facility

Proposed Rock Pit Site

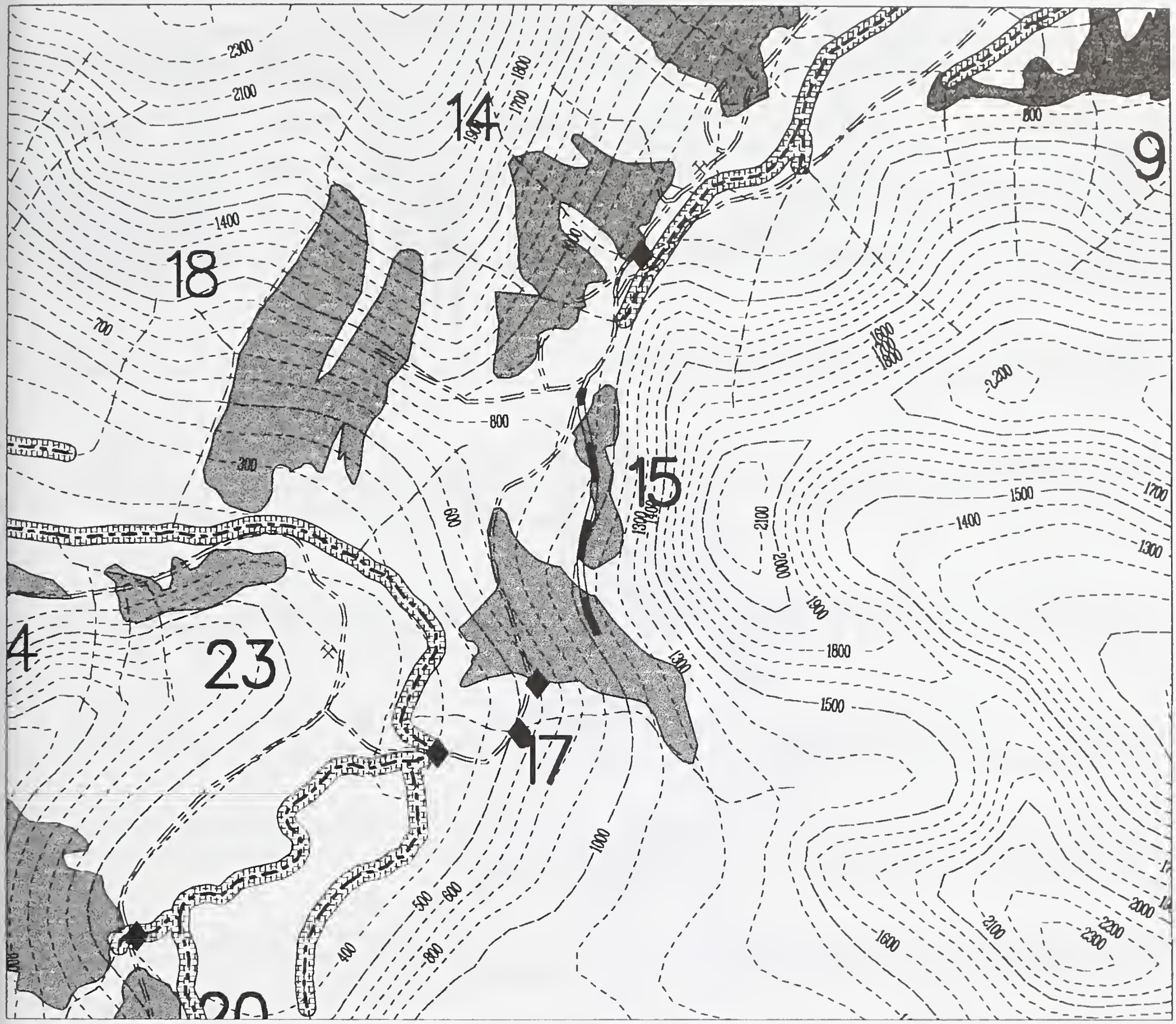
◆ Proposed Major Stream Crossing

KING GEORGE ROAD DESIGN CARDS

SEGMENT NO. 17			VCU: 462		
ROAD CLASS: COLLECTOR				SERVICE LEVEL: D	
ALTERNATIVE	1 & 6	2	3	4	5
MAINTENANCE LEVEL	N\A	Temporary	Temporary	Temporary	Temporary
LENGTH	N\A	1980 ft.	1980 ft.	1320 ft.	1980 ft.
# STREAM CROSSINGS - CLASS 1: -0			CLASS 2: -0		

Roads	Comments by: D. Barnett
No comments.	
Timber /Silviculture	**Comments by: R. Hojem/ J. Jordan**
Locate this segment to maximize mobile or shovel logging in unit 15. Allow landing zone for helicopter yarding the southeast corner of unit 17 and maximize uphill yarding in the center of unit 17.	
Watershed/Fisheries	**Comments by: J. Thompson/ D. Reed**
Consider obliterating temporary road that goes into unit 15 by removing shot rock and re-using it elsewhere if compatible with operator's schedule. No mappable tributaries to fish habitat along this road segment.	
Soils/Geology	**Comments by: J. deMontigny**
Sub-surface drainages are common on this road segment. Organic soils until border of unit 17. Construction (and water barring) should facilitate sub-surface water movement. Removal (and use) of road construction material and rehabilitation of wetlands to mitigate effects.	
Wildlife	**Comments by: S. Posner**
Obliterating this road would reduce some of the impacts to the travel corridor between Kunk Lake and King George drainages.	
Visual/Recreation	**Comments by: M. Mitchell/ D. Galla**
This segment has the potential as a trail to access the pass into Kunk Lake. Foot and/or bike access should be maintained. Portions of the road are visible from Stikine Strait.	
Access Management	**Comments by: IDT**
This temporary road will be closed after harvest by water barring as needed.	

ROAD SEGMENT 17



Proposed Road Segment

Adjacent proposed Road Segments

Class 1 Streams

Class 2 Streams

Class 3 Streams

Scale: 3 inches = 1 mile

Proposed cut units

Saltwater and Lakes

TTRA Buffers

★ Eagle Nest Tree

E Proposed Log Transfer Facility

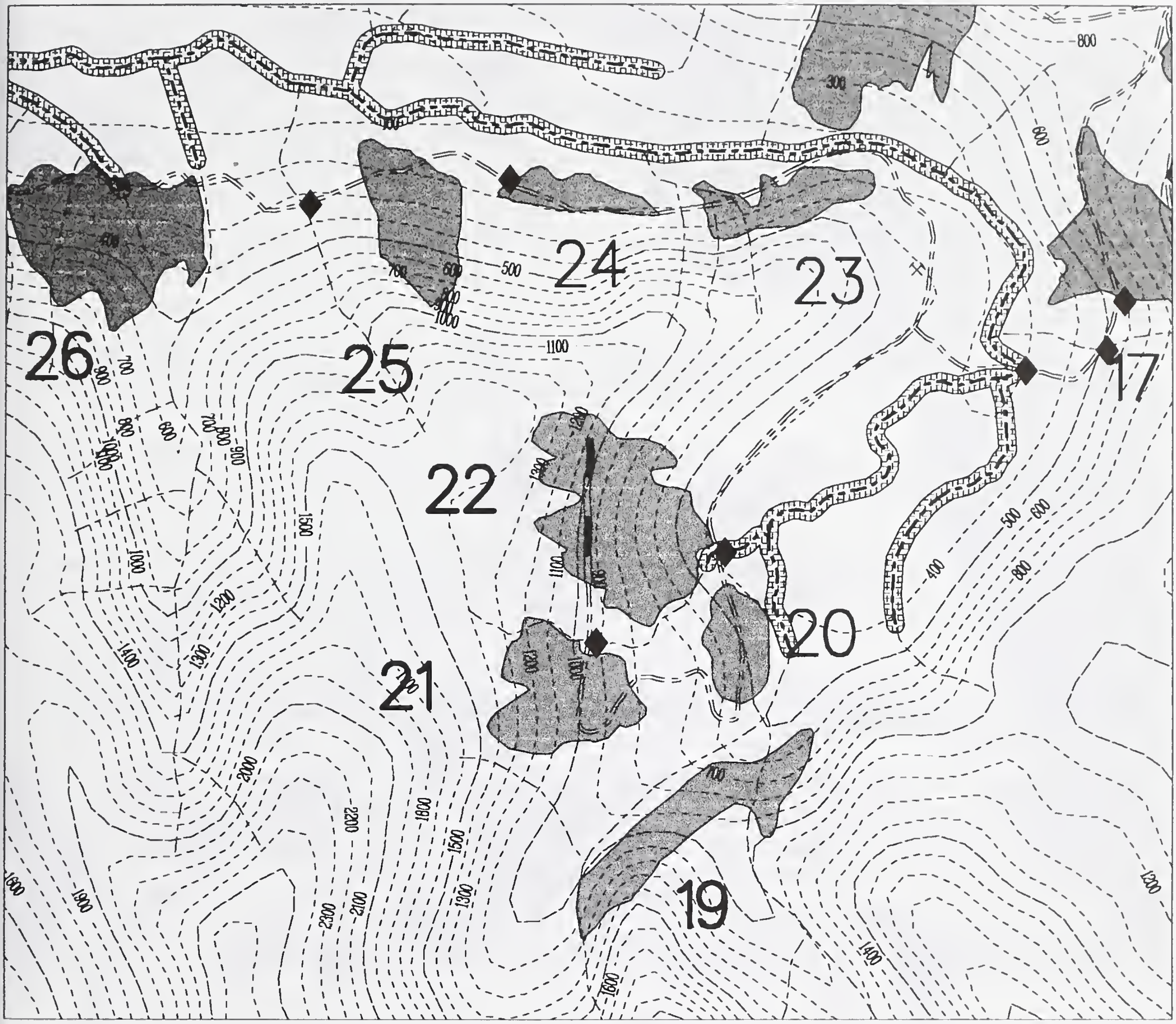
⚒ Proposed Rock Pit Site

◆ Proposed Major Stream Crossing

KING GEORGE ROAD DESIGN CARDS

SEGMENT NO. 22			VCU: 462		
ROAD CLASS: COLLECTOR				SERVICE LEVEL: D	
ALTERNATIVE	1 & 6	2	3	4	5
MAINTENANCE LEVEL	N\A	Temporary	Temporary	N/A	Temporary
LENGTH	N\A	1000 ft.	1000 ft.	N/A	1000 ft.
# STREAM CROSSINGS - CLASS 1: -0			CLASS 2: -0		
Roads	Comments by: D. Barnett				
No comments.					
Timber /Silviculture	Comments by: R. Hojem/ J. Jordan				
Locate this segment to maximize cable yarding in unit 22.					
Watershed/Fisheries	Comments by: J. Thompson/ D. Reed				
The road is well located above most streams. The hydro site between units 21 and 22 is high maintenance. Recommend prompt removal of temporary drainage structures. This segment of road is greater than 1000' from class 1 fish habitat.					
Soils/Geology	Comments by: J. deMontigny				
Stabilize cutslopes. Reclaim road building material to the extent possible after logging the units. Encourage establishment of alder.					
Wildlife	Comments by: S. Posner				
Seeding temporary roads to native grass and forb species that are palatable to elk would be beneficial.					
Visual/Recreation	Comments by: M. Mitchell/ D. Galla				
No recreation value. This road segment is seen from Bessie Peak by hikers.					
Access Management	Comments by: IDT				
This temporary road will be closed after harvest by water barring as needed.					

ROAD SEGMENT 22



Proposed Road Segment

Adjacent proposed Road Segments

Class 1 Streams

Class 2 Streams

Class 3 Streams

Scale: 3 inches = 1 mile

Proposed cut units

Saltwater and Lakes

TTRA Buffers

Eagle Nest Tree

E Proposed Log Transfer Facility

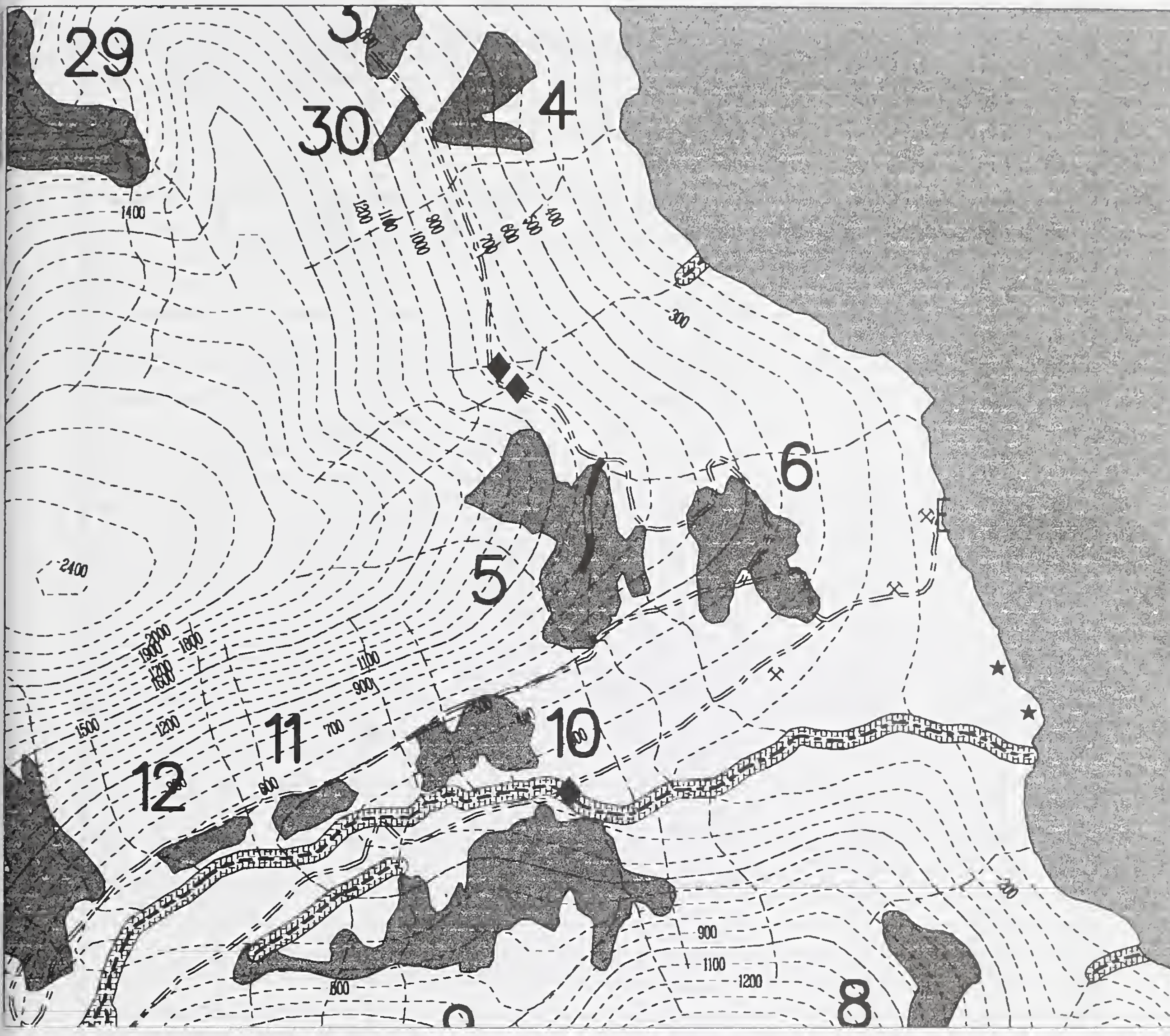
Proposed Rock Pit Site

Proposed Major Stream Crossing

KING GEORGE ROAD DESIGN CARDS

SEGMENT NO. 50			VCU: 462		
ROAD CLASS: COLLECTOR				SERVICE LEVEL: D	
ALTERNATIVE	1 & 6	2	3	4	5
MAINTENANCE LEVEL	N\A	N/A	N/A	Temporary	Temporary
LENGTH	N\A	N/A	N/A	1000 ft.	1000 ft.
# STREAM CROSSINGS - CLASS 1: -0			CLASS 2: -0		
Roads	Comments by: D. Barnett				
No comments.					
Timber /Silviculture	Comments by: R. Hojem/ J. Jordan				
Locate this segment to maximize cable yarding and allow for landing zones for helicopter yarding.					
Watershed/Fisheries	Comments by: J. Thompson/ D. Reed				
The distance to fish habitat is greater than 2000'.					
Soils/Geology	Comments by: J. deMontigny				
Remove surface aggregate and reuse, to the extent possible. Reestablish vegetation to recover site productivity.					
Wildlife	Comments by: S. Posner				
Seeding temporary roads to native grass and forb species that are palatable to elk would beneficial.					
Visual/Recreation	Comments by: M. Mitchell/ D. Galla				
This road segment is located on a bench to minimize views of this road from Zimovia travel corridor. Portions of this road segment will also be screened. If portions are seen, it will last until regeneration screens views. Seed with grass to prevent alder establishment along road. No recreational values.					
Access Management	Comments by: IDT				
This temporary road will be closed after harvest by water barring as needed.					

ROAD SEGMENT 50



Proposed Road Segment
Adjacent proposed Road Segments
Class 1 Streams
Class 2 Streams
Class 3 Streams

Scale: 3 inches = 1 mile

Proposed cut units
Saltwater and Lakes
TTRA Buffers
★ Eagle Nest Tree
E Proposed Log Transfer Facility
Proposed Rock Pit Site
◆ Proposed Major Stream Crossing

Table B-1, Water Quality and Fish Habitat Concerns for Each Unit.

Unit #	In Freshwater System	Adjacent to Fish Habitat*	Number of Class III Streams "b" and "c"**	Contains Slopes Over 67%	Mitigation for Unstable Slopes***	Wetland Mitigation***	Risk Rating****
1	partially	no	0 and 5	yes	UM, R, H	UM, H	
2	no	no	3 and 2	yes	UM, R, H	UM, H	
3	no	no	0 and 0			UM	
4	no	no	0 and 1				
5	yes	no	0 and 3			C	
6	partially	no	0 and 0				
7	no	no	0 and 1				
8	partially	no	0 and 1				
9	yes	yes	2 and 4	yes	R, H	R, H	H
10	yes	yes	0 and 2				M
11	yes	yes	1 and 3				M
12	yes	yes	1 and 3				M
13	yes	yes	2 and 5	yes	R, H	O	H
14	yes	yes	1 and 6	yes	R, H	O	H
15	yes	no	0 and 2			C	
16	no	no	0 and 1				
17	yes	yes	1 and 1	yes	R, H		M
18	yes	yes	3 and 1	yes	R, H, T		H
19	yes	no	2 and 0			R, H	
20	yes	yes	0 and 0			S	
21	yes	no	1 and 0			C	
22	yes	yes	3 and 5				M
23	yes	yes	0 and 1				
24	yes	yes	0 and 2				
25	yes	yes	0 and 0	yes	R, H		
26	yes	yes	1 and 5	yes	R, H		H
27	yes	no	0 and 1			R, H	
28	partially	no	0 and 2			R, H	
29	no	no	2 and 0			UM	
30	no	no	0 and 0				
31	no	no	0 and 0				
32	partially	no	0 and 1				

Legend for Table B-1

* We designed units adjacent to fish streams with a no-harvest buffer of at least 100 feet measured horizontally from the streambank. These streams are protected according to contract provision **"a"** which specifies that "timber harvest units shall not be within a minimum buffer zone of 100 feet on either side of Class I streams and Class II streams which flow directly into Class I streams."

Class III streams are protected according to contract provisions "b" or "c". The **"b" provision requires that "trees shall be felled...away from streamcourses" and "trees or products shall not be hauled or yarded across streamcourses unless fully suspended. Debris in streamcourses resulting from falling or yarding...shall be removed immediately..." The **"c"** provision requires that "insofar as practical, trees shall be felled and yarded away from streamcourses..." and that "Debris...shall be removed...before the yarder leaves the unit or upon completion of seasonal logging activities in the unit..." Deeply incised or unstable streams usually receive "b" protection. Shallowly incised streams with less capacity for sediment transport usually receive "c" protection.

Legend for Table B-1 (continued)

***Mitigation measures include the following:

UM area within unit unmanaged or excluded from harvest
R harvest prescription retains some trees
H helicopter yarding prescribed
T temporary road location modified to avoid unstable slopes
C cable yarding (instead of shovel)
O potential road obliteration by removing shot rock after road use
S cable yarding with suspension prescribed

****Inherent risk of sediment transport to aquatic habitat. Only highest (H) and moderate (M) risk units are indicated.

Table B-2, Water Quality and Fish Habitat Concerns by Road Segment.

Road Segment #	Length Within Freshwater System (feet)*	Number of Fish Habitat Crossings	Number of Other Critical Stream Crossings**	Other Concerns***	Mitigation****	Risk Rating*****
1	0	0	0			L
2	14000	2	0	AF	D, L	M
3	400	0	0	W	X	L
4	6835	2	2	Z	D, L, F	H
5	2600	0	0	Z	L, F	L
6	3960	0	0	W	X	L
7	5280	0	2	W	D, L, X	H
8	12870	0	2	Z, S	D, L, F, EC	H
9	12998	3	0	W	X	M
13	1000	0	1	W, AF	L, O	M
14	1100	0	0	W	L, O	L
17	1980	0	0	W	O	L
22	1000	0	0	Z	L, O	L
50	0	0	0		L, O	L

Legend for Table B-2

*Approximate length

**Includes large streams or v-notches with evidence of high debris and bedload transport.

***Other concerns include:

AF road crosses small alluvial fans
W road crosses wetland
Z road crosses oversteepened slope
S road crosses sand deposit

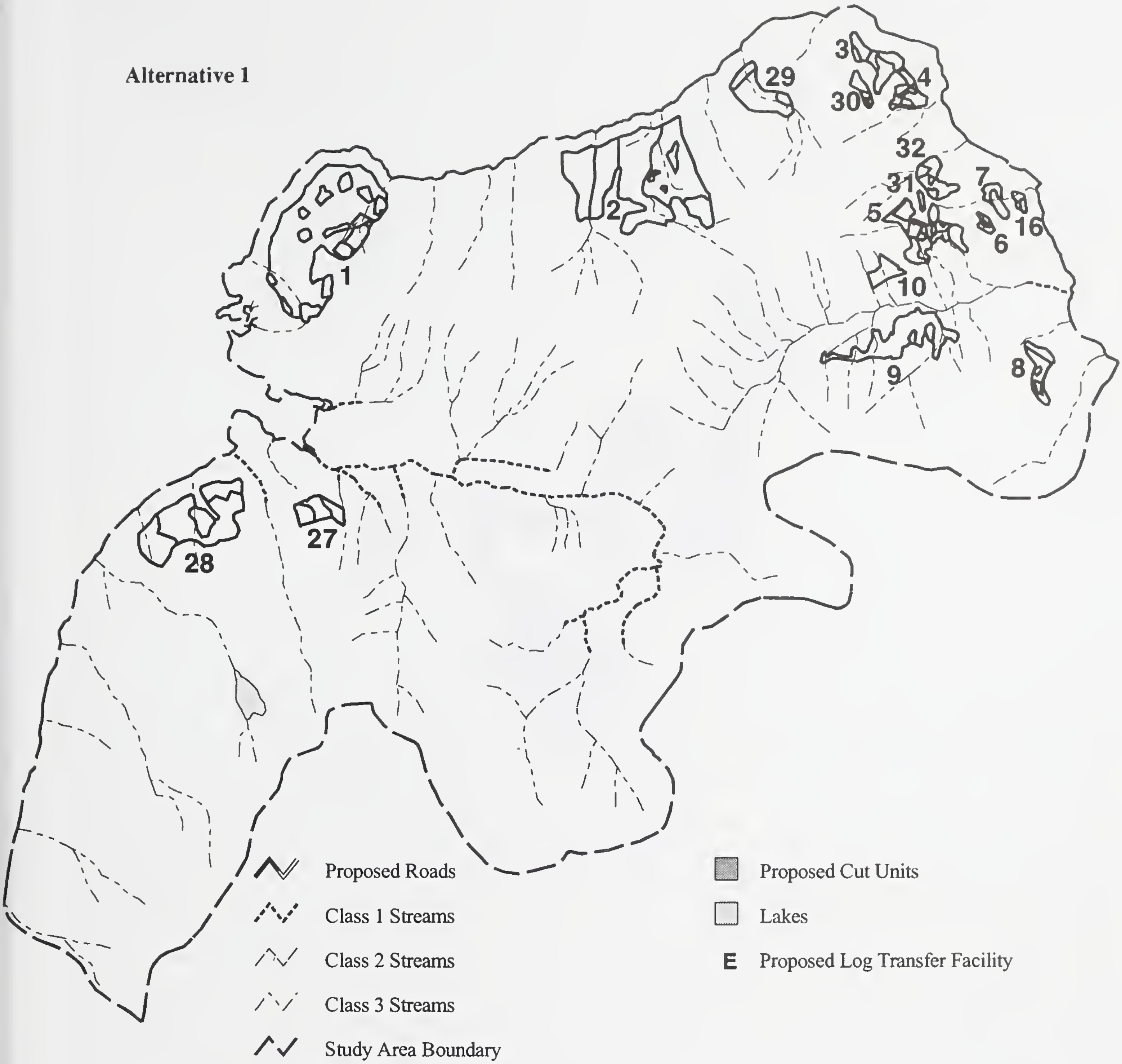
****Mitigation includes:

D stream crossing structures designed to accommodate high bedloads
X extra cross drains to minimize diversion of subsurface flow through wetlands.
F full bench cut with end haul of excavated material requires site-specific design
EC encounter with sand deposit will require immediate erosion control measures
L road located to minimize habitat crossings or avoid unstable slopes
O potential opportunity to remove shot rock after road is used (all temporary roads will have drainage structures removed)

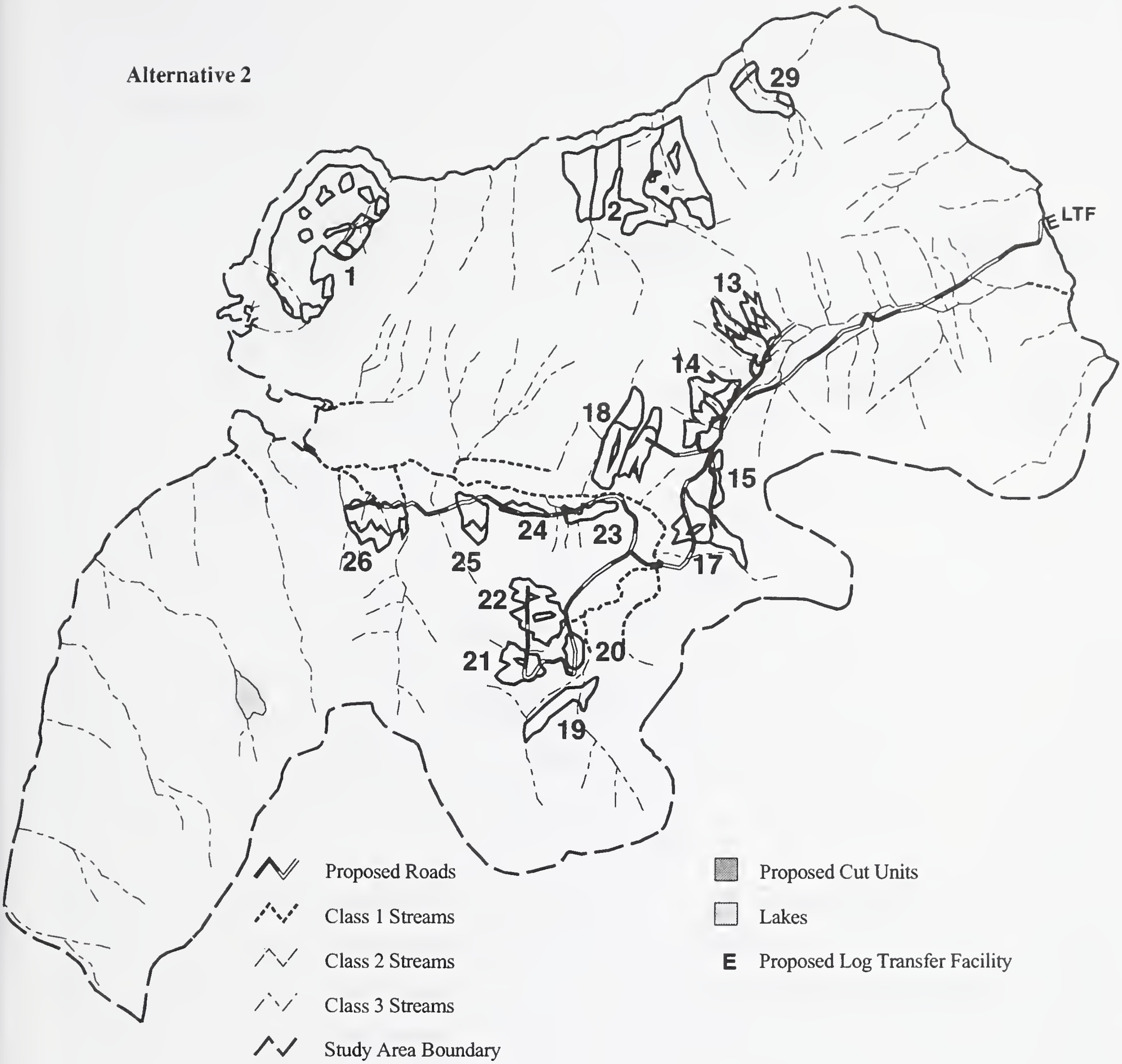
*****Inherent risk of sediment transport to aquatic habitat. Only highest (H) and moderate (M) risk units are indicated.

Road segments 13, 14, 17, 22, and 50 are temporary roads.

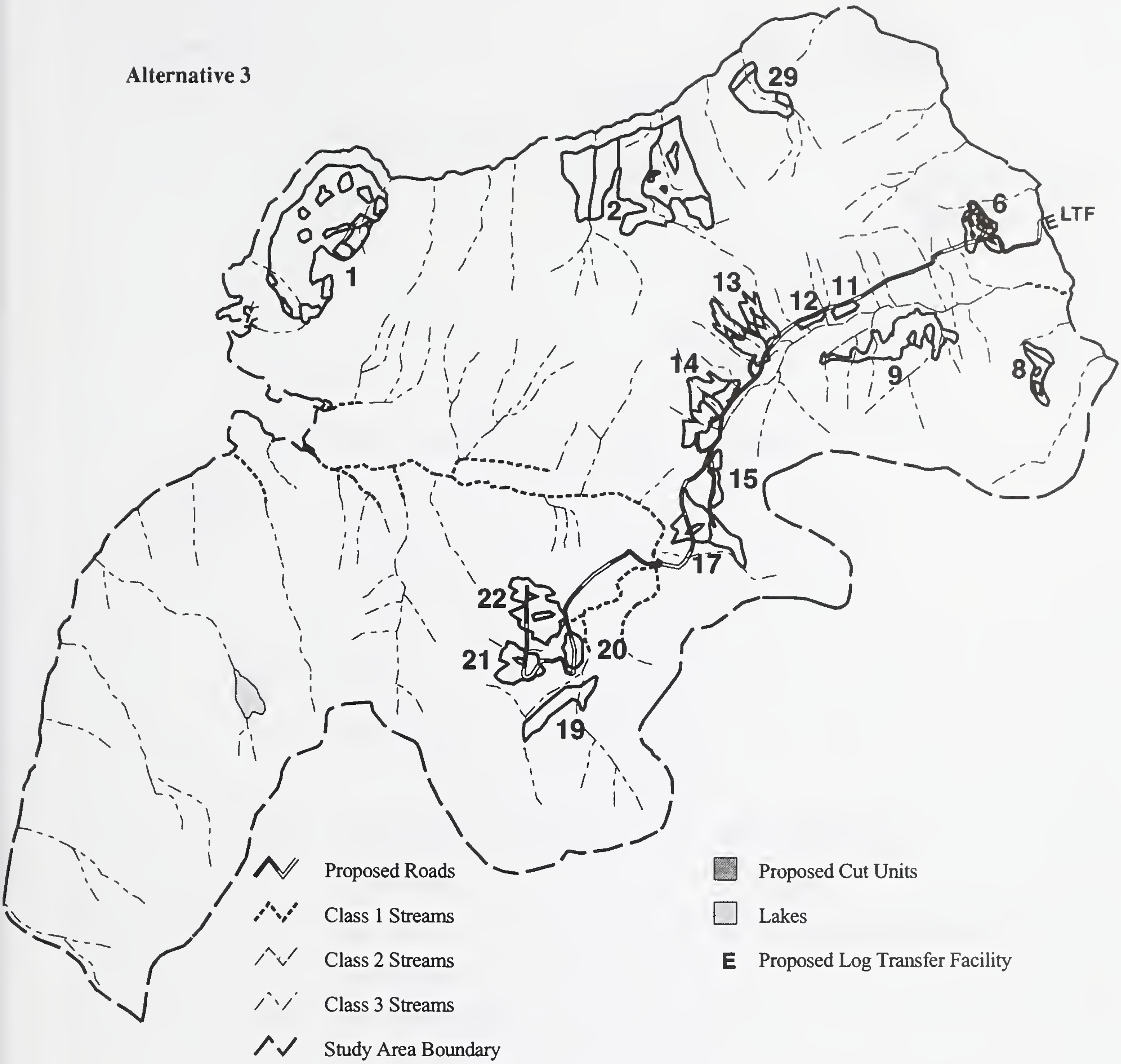
Alternative 1



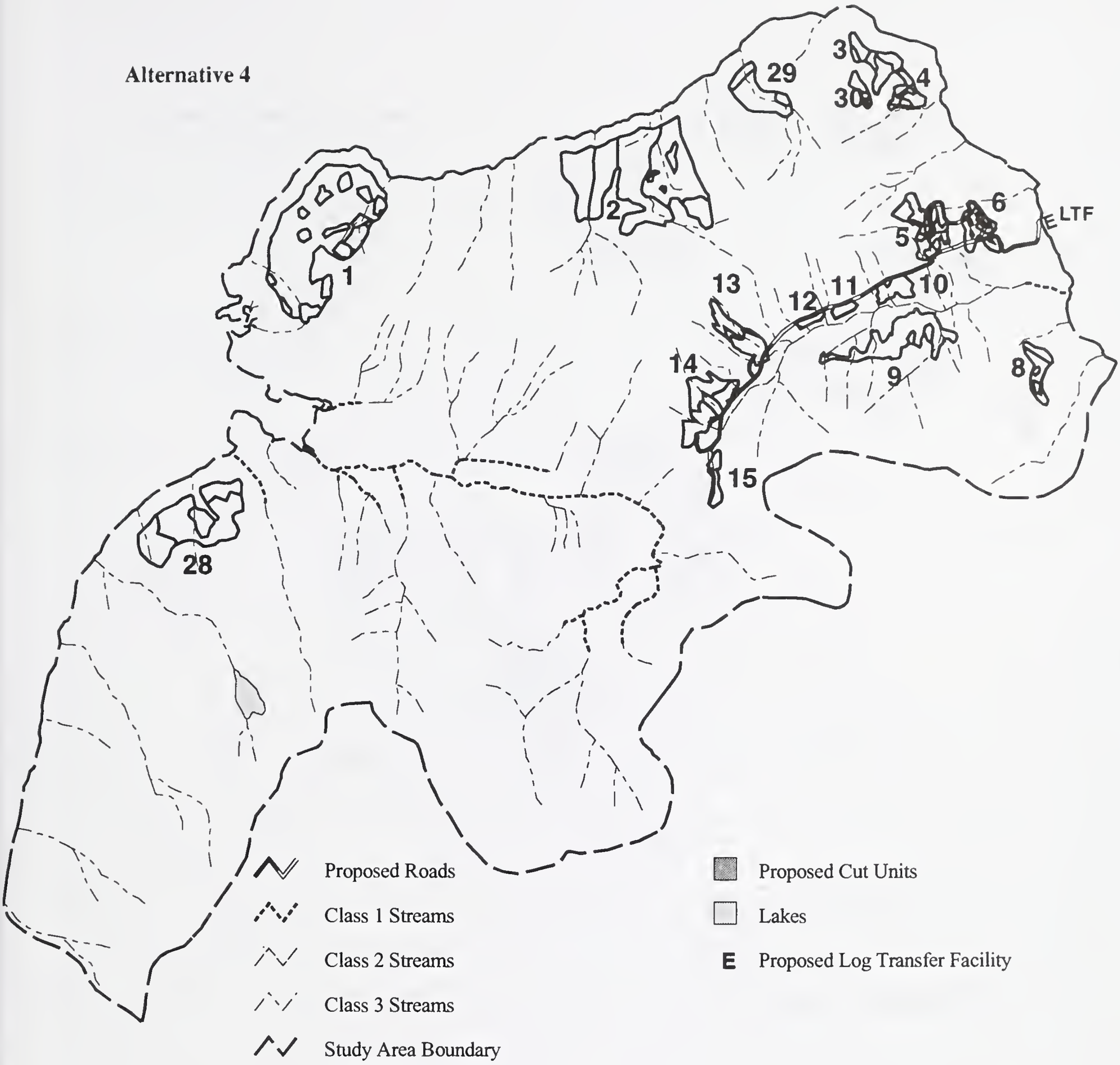
Alternative 2



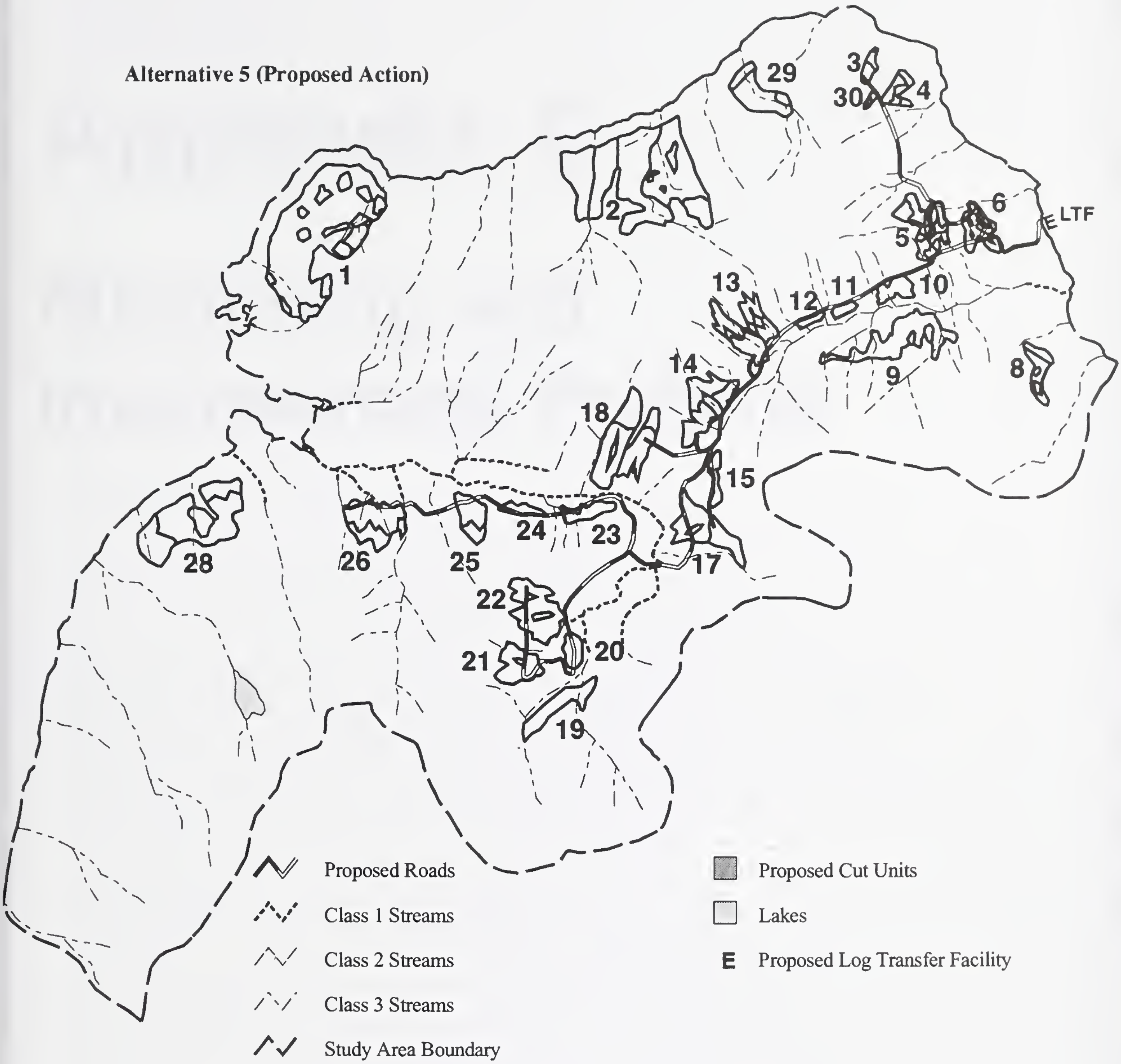
Alternative 3



Alternative 4



Alternative 5 (Proposed Action)



Appendix C

Monitoring and Improvement Projects

Appendix C

Monitoring and Improvement Projects

Monitoring Plan

Log Transfer Facility

Objective: Determine permit compliance according to permit requirements.
Method: SCUBA divers run transects and record depth and areal extent of bark accumulation once before and annually during logging activities.
Action: Notify EPA if bark deposition encompasses 100% coverage of an area one acre or larger in which the depth of bark exceeds ten centimeters at any point in that area. EPA may require removal of bark.
Cost: $1,000

Best Management Practice Implementation

Objective: Evaluate application of BMPs for water quality and fish habitat protection.
Method: Follow Alaska Region BMP implementation monitoring protocols. Randomly select completed roads and units.
Action: If protection is inadequate, apply corrective measures. If protection measures are inadequate or unsuitable, modify future recommendations.
Cost: $1000

Predicted Timber Volume

Objective: Determine if harvest prescriptions achieved predicted timber volume.
Method: Work with timber purchaser to obtain volume information under lump sum sale. If scaled sale, check harvest records.
Action: Refine estimates for future sales.
Cost: $1000

C - Monitoring and Improvement Projects

Scenic Resources

Objective: Determine if harvest prescriptions were implemented and effective in meeting the visual quality objectives. Determine how close resulting harvest is to scenic thresholds identified in the desired condition analysis (Appendix A) and Forest Plan.
Method: Two landscape architects will independently evaluate harvest implementation and effectiveness. Compare their results to public feedback to verify the level of viewing sensitivity. Public feedback may include the use of Zimovia Highway residents, Wrangell residents, and ferry passengers. Use before and after photos in addition-site visits. Information will validate threshold values.
Action: Produce a chart showing the number of acres treated, the prescription and the result. The information, organized by viewshed and land unit, will help determine proximity to threshold values. If harvest exceeds or hits threshold values, no further harvest should occur until visual recovery. If thresholds still exceed the resulting harvest, more harvest could occur under an adaptive approach.
Cost: $2000-$7000 depending on level of public involvement in the evaluation process.

Road Use

Objective: Determine the level of road use and if traffic control measures are effective.
Method: Utilize a combination of traffic counters and track plates during the peak recreation and hunting seasons. Make visual observations of tracks on roads and evidence of people circumventing barriers. Also use public feedback on the value of roads as trails for non-motorized forms of access and quantity of use.
Action: This data will be useful in evaluating the effects that timber harvest and road development have on increased access in close proximity to communities. Revising traffic control strategies may be necessary if they are not effective in limiting motorized use to certain areas.
Cost: $5000

Off Road Vehicle Use

Objective: Determine the extent and impact of off-road recreation vehicle traffic.
Method: Field investigations will be done to determine if off-road use is occurring in the areas where sensitive plants have been located. The amount of impact will be assessed using ocular estimates.
Action: If impacts are occurring, a change in access management will be considered.
Cost: $200 annually

Wildlife Harvest

Objective: Determine if changes in harvest of big game and furbearers are consistent with predictions in the King George FEIS subsistence report. Harvest rates are important in assessing whether the supply of game is adequate to meet demand by subsistence hunters.
Method: Annually review ADFG harvest data to determine subsistence versus non-subsistence harvest and changes in the rate of harvest over time.
Action: If non-subsistence harvest or increasing total harvest trends indicate that future populations may be insufficient to meet subsistence demand, assess hunting regulations and travel management (road access) to determine needed changes.
Cost: $350 per year

C - Monitoring and Improvement Projects

Blowdown

Objective: To determine if there is any blowdown after the sale has been logged in the harvest units and buffer strips. If so, is there a greater amount of blowdown related to a particular harvest prescription or location.
Method: The method of determining if there has been blowdown within the sale area will be by aerial flight over the area, followed up by ground reconnaissance.
Action: The action taken if blowdown occurs will be to evaluate the possibility of a salvage sale and revise future prescriptions.
Costs: Approximately $1,000.

Regeneration

Objective: To determine if there is adequate natural stocking within each unit four years after timber harvest.
Method: The method of determining stocking will be field exams of each unit harvested.
Action: If adequate stocking is not present within any harvest unit, it will be planted to bring stocking up to at least 300 trees per acre.
Costs: $15,000-$35,000 depending on the alternative selected.

Prescription Accomplishment

Objective: To determine if timber sale prescriptions met the objectives of other resources after harvest.
Method: To determine if this objective has been met, IDT members will do a field review of selected units and discuss the results.
Action: The results of the field review will help to revise future prescriptions.
Costs: Approximately $ 5,000.

Forest Health

Objective: To determine what the health of future timber stands will be following a partial harvest prescription.
Method: Field exams will be done to determine the extent of porcupine damage, black-headed budworm outbreak, and heart rot on residual and newly regenerated trees. These field exams will be done in the fourth and fifteenth year after timber harvest.
Action: The action taken may be the prevention of further spread of the disease organism.
Costs: $15,000-$30,000 depending on the alternative selected.

Marine Slash

Objective: To determine if the amount of slash escaping from the boom bags poses a hazard to navigation or creates problems for sport and commercial fishermen in the vicinity of the helicopter drop zone.
Method: Have contract administrators and operators watch for floating slash and retrieve it. Request comments from fishermen and boat operators in the area.
Action: Require different methods of slash containment or use of barge instead of salt water drop.
Cost: $1,000

Potential Improvement Projects

If an action alternative is selected these projects may be listed in the King George Timber Sale Area Improvement Plan. All projects comply with Forest Service KV Handbook direction (FSH 2409.19). KV funding for projects other than regeneration surveys and tree planting would be dependent on the amount of sale revenues. The following projects are not listed in order of KV funding priority.

Natural regeneration surveys- These surveys will be done on each harvest unit to determine if the units are stocked 5 years after harvest.

Tree planting- Harvest units that are not adequately stocked within 5 years after harvest will be planted to increase stocking. Units may also be planted to increase the species diversity of yellow-cedar, redcedar and Sitka spruce.

Porcupine damage surveys- Porcupine surveys will need to be done to determine if precommercial thinning will be needed. Porcupine control may need to be implemented to reduce damage to sapling and pole size trees.

Fish enhancement- Blasting may be done to enhance jump pools for coho.

Kunk drainage easement- Logging slash may be removed from the end of the spur road into unit 17 for a width of about 5 feet to enhance the access into the Kunk Lake drainage.

Slash treatment- Logging slash will be removed, by burning or chipping, from landings along the main specified road that might be built from Honeymoon Creek into King George Creek.

Appendix D

LTF Site Selection, Design, and Marine Effects

Appendix D

LTF Site Selection, Design, and Marine Effects

Log Transfer Facility

A log transfer facility (LTF) is the location where logs are transferred between a ground based transport system of roads and trucks, and a water based transport system of rafts, barges and tugs. The proposed action (alternative 5) and alternatives 2, 3 and 4 all depend on development of a road transportation network that would be linked to a proposed new LTF within the study area. Alternative 1 proposes to harvest exclusively with a helicopter, using a combination of water drops or barge landings with possible tow to Pat Creek LTF on Wrangell Island, located 3 miles east of the study area.

Early on in the planning process, there were seven potential log transfer sites identified for the King George Study Area. These sites were investigated as part of the Stikine Area Log Transfer Facility Final Report (US Forest Service R10-91-54), prepared by Peratrovich, Nottingham, & Drage, Inc., in 1992. The investigation included upland surveys and near-shore dives. The four sites (D, E, F & G) on the west side of the study area (one just south of King George Bay, and the other three located north of the bay) were considered unsuitable due to shoaling rocks, shallow water and sand depositions that indicated high energy wave action from winter storms. All of these sites are relatively close to the King George Bay estuary as well as the small estuaries north of King George Bay. They had a high potential for affecting estuarine resources in this area. Coastal development in this area also has a high potential for affecting cultural resources.

The northernmost site (C) on the Honeymoon side was dropped due to the length of road necessary, steep side slopes, and because the road would have to be built through a managed second growth stand.

The King George IDT considered LTF sites A and B on the Honeymoon side, and also investigated site H, on the northwest corner of the study area. US Fish and Wildlife Service and National Marine Fisheries Service divers investigated this site in 1993. Site H was soon dropped for the same reasons as the other sites on the west side of the study area: evidence of heavy winter storm action, concerns over visual impact, recreational conflicts, commercial and sport fishing, and subsistence use. In addition, this site is in fairly close proximity to a sea lion haul out, considered sensitive habitat.

Sites A and B both have minimal protection from winter storm wave action, although wave impact on the beach appears minor.

Site A is located 3/4 mile north of the mouth of Honeymoon Creek, at the southern edge of an existing managed stand. The road approach to this site would require approximately 150 feet of full bench rock cut at a 15% grade to reach the water. Visually, this site will be difficult to screen from Zimovia Strait, homes located between 8 mile and McCormack Creek, and the Wrangell road system. In addition, a small intermittent stream flows through this site.

Site B is located 1/2 mile north of the mouth of Honeymoon Creek. The approach is much more gentle with 30% side slopes and 6% grade. This site would have the best potential for visual screening. Development of a facility at this site could be accomplished with the least amount of ground disturbance on the beachfront, of all sites considered. The proximity to the mouth of Honeymoon creek does pose a potential conflict with the crab fishery in the area. In addition, there have been reports of herring spawning in the general area, although this has not been officially documented by ADFG. Because Site B appeared to be the most accessible with the least amount of disturbance it was chosen for more detailed analysis and preliminary design work. The LTF will be described as Zimovia Strait LTF.

Log transfer facility impacts usually include 1) loss of habitat to fill, 2) leaching of toxic soluble substances from subtidal or upland woodwaste deposits, and 3) degradation or smothering of benthic habitat and organisms. These effects can be mitigated in large part through site selection, design and construction measures, and operating guidelines.

Siting Guidelines

The Alaska Timber Task Force, an interagency/industry group, developed the following siting guidelines for log transfer facilities in southeast Alaska. Sites should attempt to meet the best mix of guidelines, although it is recognized that not all sites can meet all guidelines.

The site should be at least 300 feet away from the mouths of Class I fish streams or important fish spawning and rearing areas.
The Zimovia Strait LTF site is about 2600 feet from the nearest Class I stream (Honeymoon Creek). Detailed field reconnaissance of the area did not detect fish spawning or rearing areas nearer than Honeymoon Creek either north or south of the LTF site.

The site should be protected from weather, suitable for anchoring, and with at least 20 acres for temporary log storage and booming.
The adjacent marine waters are not well protected for building or storing log rafts. Only temporary raft storage could be provided dependent on weather. Operators could store rafts at East Point off Woronkofski Island (4 miles north), at the APC Shoemaker Bay mill site (5 miles northeast) or at the Pat Creek LTF site on Wrangell Island (2.5 miles east).

The site should be near at least five acres of relatively flat uplands.
The selected site requires minimal road construction to connect with the mainline road system in all roaded alternatives. A sort yard will be constructed about 800 feet up the road with better opportunities for erosion control and runoff detention away from marine waters.

The access road should maintain a grade of 10% or less.
The access road can be constructed at a 10 - 15% grade.

The site should be adjacent to strong tidal currents to disperse sunken or floating wood debris.
The site has a northeastern exposure on Zimovia Strait with fair tidal flushing. The divers' general conclusion was that the site only marginally met bark dispersal guidelines but its exposure in close proximity to deeper waters may facilitate dispersal during seasonal storms. The tidal patterns at this site may be more likely to disperse material during use and construction than Site A.

Sites should be located in the least productive intertidal and subtidal zones.
Although the site is near the Honeymoon estuary it does not exhibit geomorphic or biologic characteristecs of highly productive estuarine wetlands. The contract divers found abundant skate egg cases but only sparse and small populations of bay scallops and Dungeness crab in the vicinity in 1992. The IDTeam noted that most commercial crab pots appear to be well south of the site (on the south side of Honeymoon Creek). Nevertheless, the potential affects of runoff, bark accumulation, leachates, and logging slash near the LTF is a concern to be addressed through design and operating guidelines. The location of the sort yard away from marine waters will minimize runoff potentially transporting sediment, petroleum products, or other deleterious substances into these zones.

Sites should not be near sensitive habitat or shellfish concentration areas.
Divers noted that the uniformity of the intertidal and subtidal zones in the surrounding area would be favorable for recolonization of displaced or affected organisms. They did not note sensitive habitat or shellfish concentrations.

Sites should be safely accessible to tug boats with rafts under most conditions.
There appear to be no navigational hazards in the area.

Sites should be located where log rafts will not ground at low tide.
The low angle ramp is designed to work with the tide. Proper boom placement will prevent grounding. As previously mentioned, the site is not well protected for raft storage.

Sites should avoid bald eagle nests.
The nearest documented bald eagle nests are about 1/2 mile south of the site.

Additional consideration should be given to the following:

Sites should accommodate future logging operations.
The LTF design will accommodate both large and small operators. It is a low angle siide that requires minimal equipment to transfer bundled logs from trucks to the water for rafting.

Sites should avoid areas with established commercial, subsistence, and sport fishing activity, high levels of recreation use, high scenic quality, or documented concentrations of species commonly pursued by fishermen.
Because the site is close to Wrangell and near an established commercial crab fishery, conflicts with recreational boaters, commercial fishermen, and scenic qualities remain a

concern. Visual screening of the site was an important consideration in designing the facility.

Design and Construction Measures

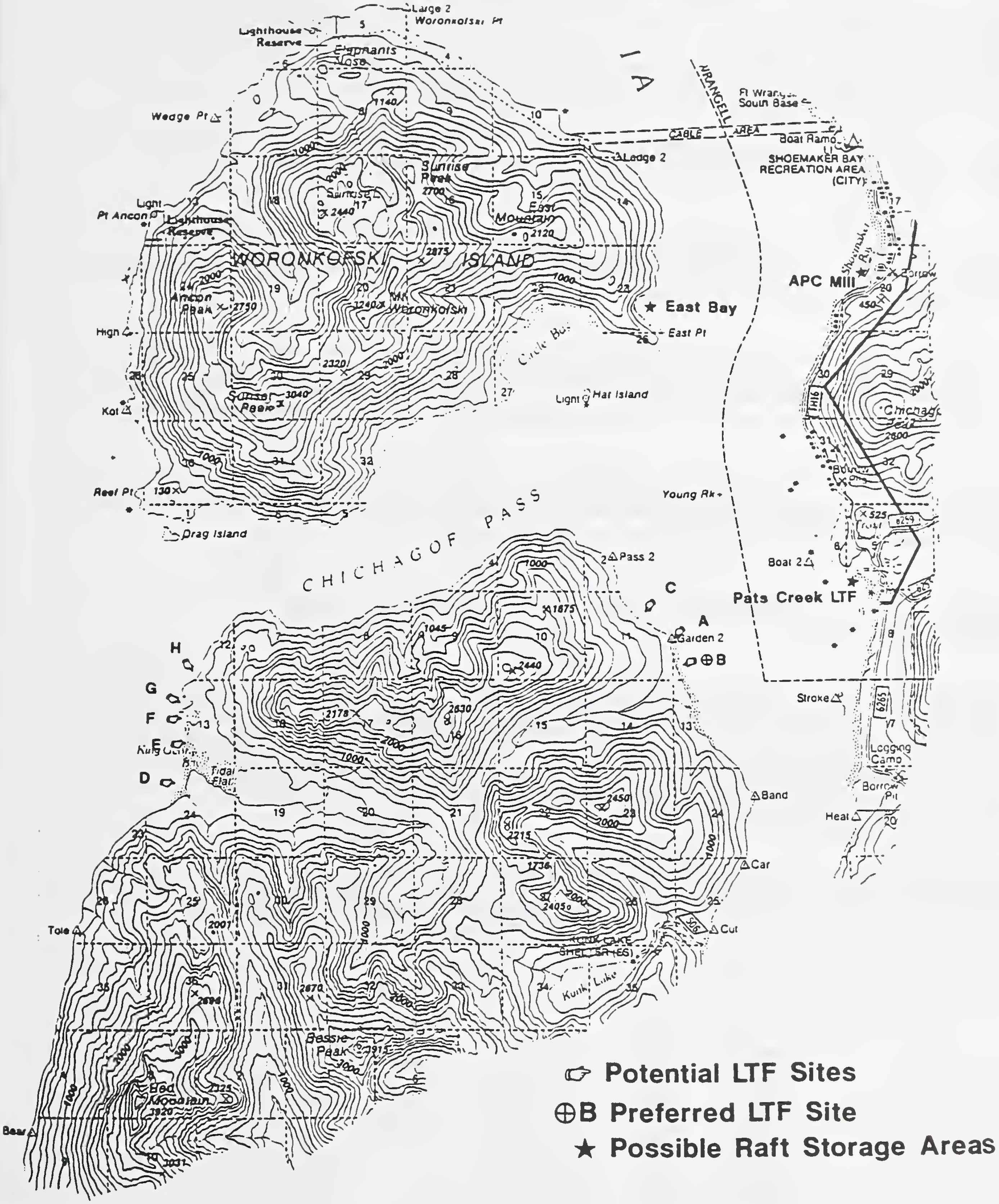
Chapter 3 describes some of the special design features intended to minimize visual impacts of the LTF. The LTF has been designed to limit fill to 0.2 acres of intertidal and subtidal area. The LTF card displays erosion and sediment control features designed to mitigate the concern for pollutants entering marine waters.

Operating Guidelines

Although flushing is a desirable site feature, loss of floating or near-submerged debris from this site may be a concern for recreational boaters and commercial fishermen. The use of log booms will contain most of this debris. The contract administrator will ensure that the operator is aware of this concern. The contract will include provisions to ensure that the operator minimizes the amount of loose floating slash in the area. The monitoring plan (Appendix C) also addresses this concern. The contract may also require a timing clause to minimize conflicts with fishing.

We anticipate that the LTF permit will require a pollution prevention plan describing routine maintenance and monitoring of pollution control measures. A special BMP requires regular LTF cleanup during operations. We also anticipate that the LTF permit will require a monitoring dive to determine the depth and extent of bark accumulation each year of operation.

Figure D-1: LTF Sites and Raft Storage Areas



KING GEORGE LTF DESIGN CARD

<table>
<tr><td colspan="3">SEGMENT NO. LTF</td><td colspan="3">VCU: 462</td></tr>
<tr><td colspan="5">ROAD CLASS: COLLECTOR</td><td>SERVICE LEVEL: D</td></tr>
<tr><td>ALTERNATIVE</td><td>1 & 6</td><td>2</td><td>3</td><td>4</td><td>5</td></tr>
<tr><td>DEVELOPED</td><td>No</td><td>Yes</td><td>Yes</td><td>Yes</td><td>Yes</td></tr>
<tr><td colspan="6"># STREAM CROSSINGS - CLASS 1: -0 CLASS 2: -0</td></tr>
<tr><td>Roads</td><td colspan="5">Comments by: D. Barnett</td></tr>
<tr><td colspan="6">No comments at this time.</td></tr>
<tr><td>Timber /Silviculture</td><td colspan="5">Comments by: R. Hojem/ J. Jordan</td></tr>
<tr><td colspan="6">Allow room for parking 2-5 transport vehicles on the south edge of the LTF working area. Keep size of LTF to a minimum while still allowing efficient transfer of log bundles.</td></tr>
<tr><td>Watershed/Fisheries</td><td colspan="5">Comments by: J. Thompson/ D. Reed</td></tr>
<tr><td colspan="6">LTF plan displays site specific application of BMP's 14.4, 12.17, 14.8, and 14.27 for erosion and sediment control and revegetation. Ensure that these measures are incorporated into pollution prevention plan. Site is greater than 2600' from a class I fish stream.</td></tr>
<tr><td>Soils/Geology</td><td colspan="5">Comments by: J. deMontigny</td></tr>
<tr><td colspan="6">Prevent sediment and logging debris from entering esturine environment by placing structures or vegetation filter along the edge of working surface. Ensure soil placement is above highest tide level.</td></tr>
<tr><td>Wildlife</td><td colspan="5">Comments by: S. Posner</td></tr>
<tr><td colspan="6">No concern.</td></tr>
<tr><td>Visual/Recreation</td><td colspan="5">Comments by: M. Mitchell/ D. Galla</td></tr>
<tr><td colspan="6">Visible from Wrangell Island and Zimovia Strait travelways. Provides access to road system and entire study area. Protect buffer around LTF with pre-splitting controlled blasting. Minimize clearing widths to the extent practical. In particular, protect forest screen between LTF and water on southern 1/2 of site by considering the use of blasting mats to achieve this protection. Ensure minimum clearing of this buffer making it as wide as possible. Establish vegetative cover along bulkhead.</td></tr>
<tr><td>Sale Administration</td><td colspan="5">Comments by: T. Gunn</td></tr>
<tr><td colspan="6">When applying for permits for log rafting area, allow for adequate room. 500' x 1000' recommended.</td></tr>
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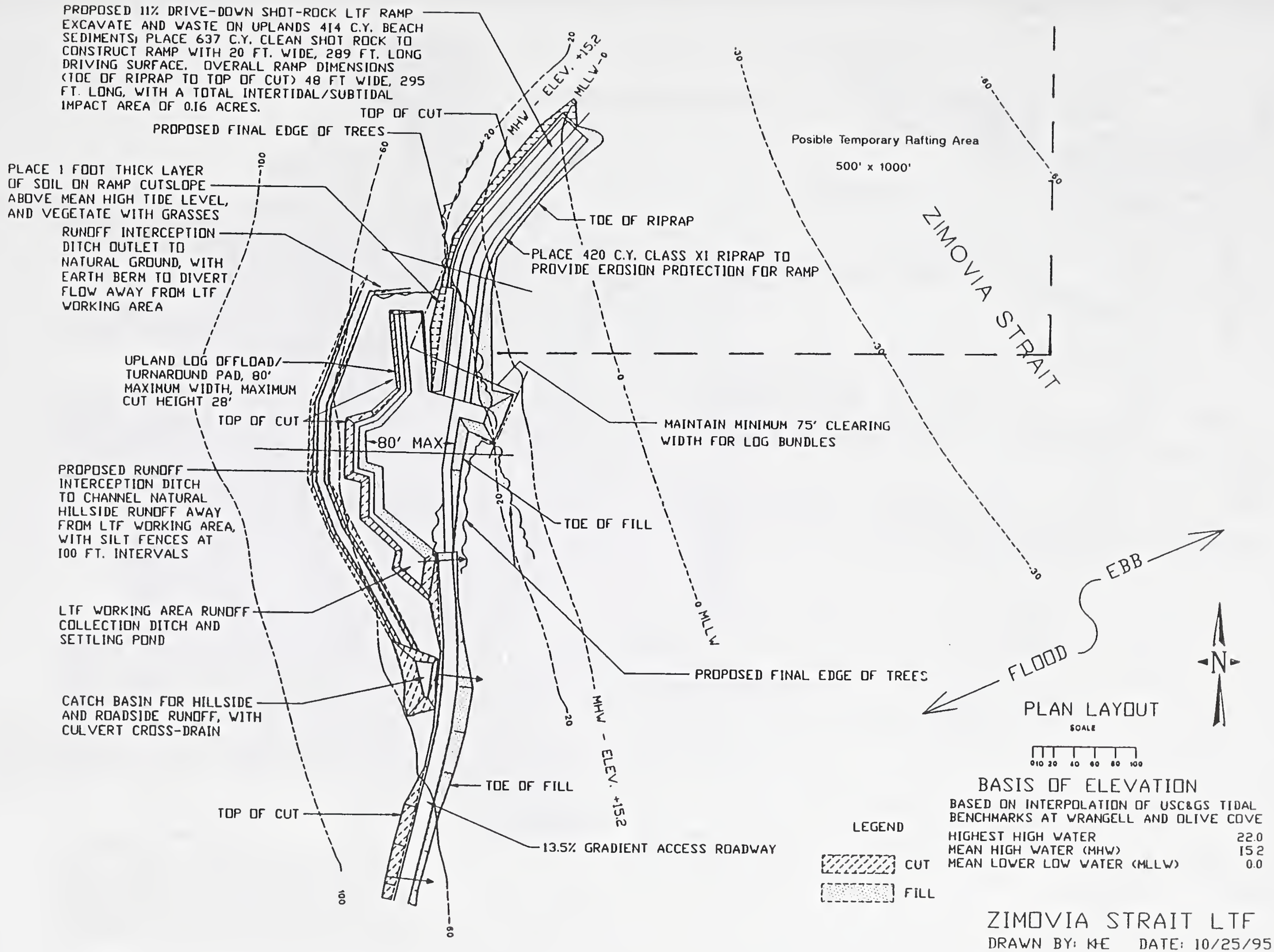
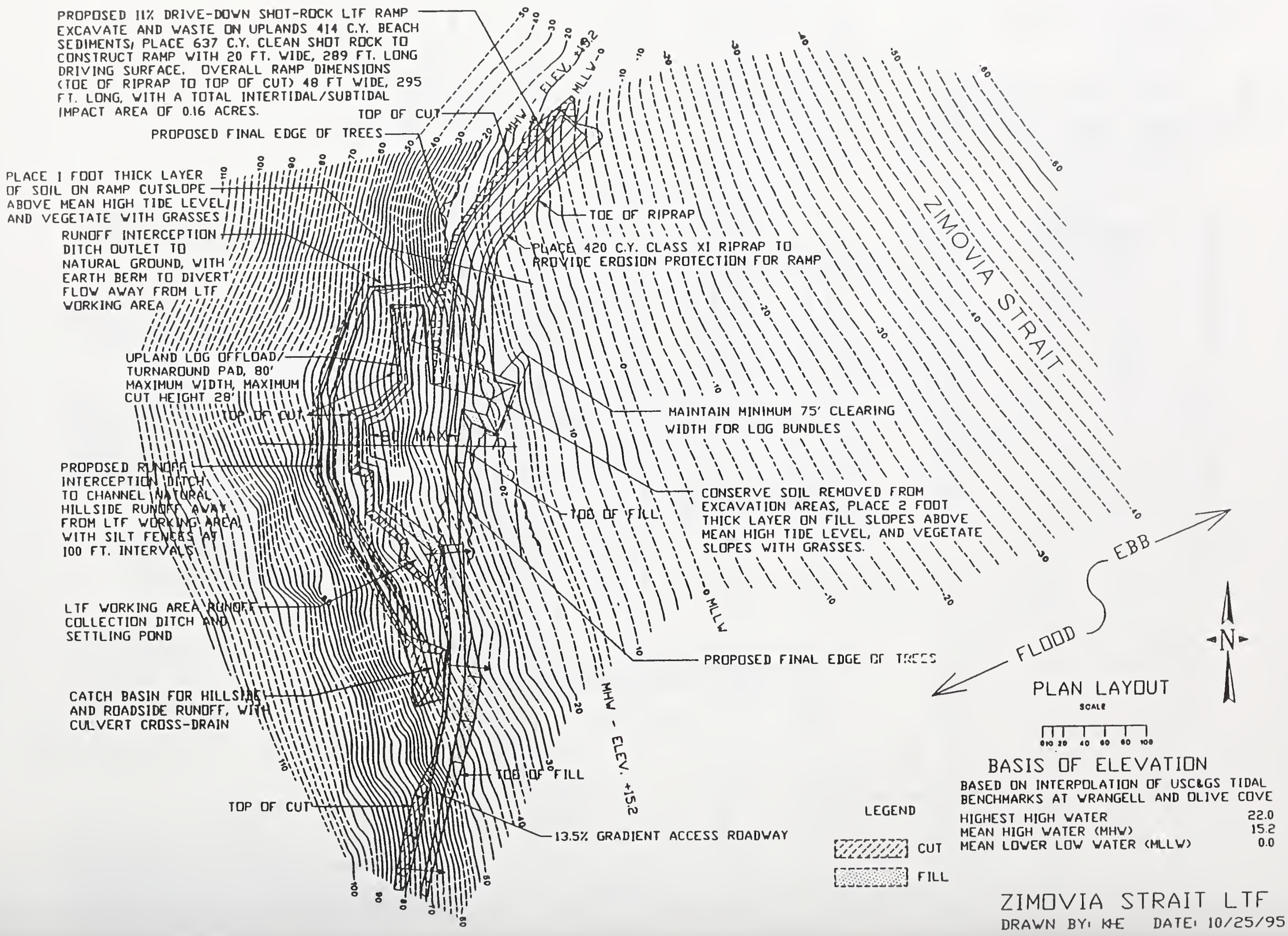

PROPOSED 11% DRIVE-DOWN SHOT-ROCK LTF RAMP EXCAVATE AND WASTE ON UPLANDS 414 C.Y. BEACH SEDIMENTS; PLACE 637 C.Y. CLEAN SHOT ROCK TO CONSTRUCT RAMP WITH 20 FT. WIDE, 289 FT. LONG DRIVING SURFACE. OVERALL RAMP DIMENSIONS (TOE OF RIPRAP TO TOP OF CUT) 48 FT WIDE, 295 FT. LONG, WITH A TOTAL INTERTIDAL/SUBTIDAL IMPACT AREA OF 0.16 ACRES.
TOP OF CUT
PROPOSED FINAL EDGE OF TREES
PLACE 1 FOOT THICK LAYER OF SOIL ON RAMP CUTSLOPE ABOVE MEAN HIGH TIDE LEVEL, AND VEGETATE WITH GRASSES
RUNOFF INTERCEPTION DITCH OUTLET TO NATURAL GROUND, WITH EARTH BERM TO DIVERT FLOW AWAY FROM LTF WORKING AREA
UPLAND LOG OFFLOAD/ TURNAROUND PAD, 80' MAXIMUM WIDTH, MAXIMUM CUT HEIGHT 28'
TOP OF CUT
80' MAX
PROPOSED RUNOFF INTERCEPTION DITCH TO CHANNEL NATURAL HILLSIDE RUNOFF AWAY FROM LTF WORKING AREA, WITH SILT FENCES AT 100 FT. INTERVALS
LTF WORKING AREA RUNOFF COLLECTION DITCH AND SETTLING POND
CATCH BASIN FOR HILLSIDE AND ROADSIDE RUNOFF, WITH CULVERT CROSS-DRAIN
TOP OF CUT
TOE OF FILL
13.5% GRADIENT ACCESS ROADWAY
MHW - ELEV. +15.2
MLLW-0
TOE OF RIPRAP
PLACE 420 C.Y. CLASS XI RIPRAP TO PROVIDE EROSION PROTECTION FOR RAMP
MAINTAIN MINIMUM 75' CLEARING WIDTH FOR LOG BUNDLES
TOE OF FILL
PROPOSED FINAL EDGE OF TREES
0 MLLW
MHW - ELEV. +15.2
Posible Temporary Rafting Area
500' x 1000'
ZIMOVIA STRAIT
EBB
FLOOD
N
PLAN LAYOUT
SCALE
0 10 20 40 60 80 100
BASIS OF ELEVATION
BASED ON INTERPOLATION OF USC&GS TIDAL BENCHMARKS AT WRANGELL AND OLIVE COVE
HIGHEST HIGH WATER 22.0
MEAN HIGH WATER (MHW) 15.2
MEAN LOWER LOW WATER (MLLW) 0.0
LEGEND
CUT
FILL
ZIMOVIA STRAIT LTF
DRAWN BY: KHE DATE: 10/25/95


PROPOSED 11% DRIVE-DOWN SHOT-ROCK LTF RAMP EXCAVATE AND WASTE ON UPLANDS 414 C.Y. BEACH SEDIMENTS, PLACE 637 C.Y. CLEAN SHOT ROCK TO CONSTRUCT RAMP WITH 20 FT. WIDE, 289 FT. LONG DRIVING SURFACE. OVERALL RAMP DIMENSIONS (TOE OF RIPRAP TO TOP OF CUT) 48 FT WIDE, 295 FT. LONG, WITH A TOTAL INTERTIDAL/SUBTIDAL IMPACT AREA OF 0.16 ACRES.
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RUNOFF INTERCEPTION DITCH OUTLET TO NATURAL GROUND, WITH EARTH BERM TO DIVERT FLOW AWAY FROM LTF WORKING AREA
UPLAND LOG OFFLOAD/ TURNAROUND PAD, 80' MAXIMUM WIDTH, MAXIMUM CUT HEIGHT 28'
TOP OF CUT
80' MAX
PROPOSED RUNOFF INTERCEPTION DITCH TO CHANNEL NATURAL HILLSIDE RUNOFF AWAY FROM LTF WORKING AREA WITH SILT FENCES AT 100 FT. INTERVALS
LTF WORKING AREA RUNOFF COLLECTION DITCH AND SETTLING POND
CATCH BASIN FOR HILLSIDE AND ROADSIDE RUNOFF, WITH CULVERT CROSS-DRAIN
TOP OF CUT
TOE OF FILL
13.5% GRADIENT ACCESS ROADWAY
MHW - ELEV. +15.2
MLLW
TOE OF RIPRAP
PLACE 420 C.Y. CLASS XI RIPRAP TO PROVIDE EROSION PROTECTION FOR RAMP
ZIMOVIA STRAIT
MAINTAIN MINIMUM 75' CLEARING WIDTH FOR LOG BUNDLES
CONSERVE SOIL REMOVED FROM EXCAVATION AREAS, PLACE 2 FOOT THICK LAYER ON FILL SLOPES ABOVE MEAN HIGH TIDE LEVEL, AND VEGETATE SLOPES WITH GRASSES.
TOE OF FILL
0 MLLW
PROPOSED FINAL EDGE OF TREES
EBB
FLOOD
N
PLAN LAYOUT
SCALE
0 10 20 40 60 80 100
BASIS OF ELEVATION
BASED ON INTERPOLATION OF USC&GS TIDAL BENCHMARKS AT WRANGELL AND OLIVE COVE
HIGHEST HIGH WATER 22.0
MEAN HIGH WATER (MHW) 15.2
MEAN LOWER LOW WATER (MLLW) 0.0
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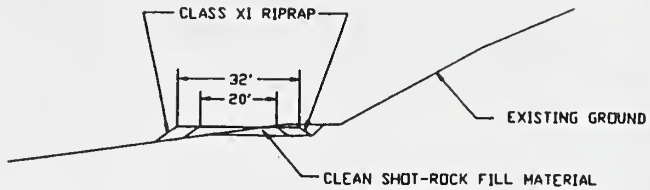
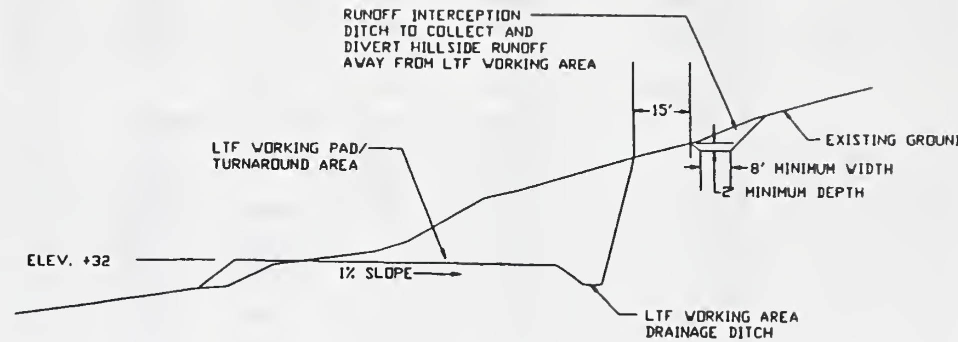
CUT
FILL
ZIMOVIA STRAIT LTF
DRAWN BY: KHE DATE: 10/25/95



TYPICAL RAMP CROSS SECTION

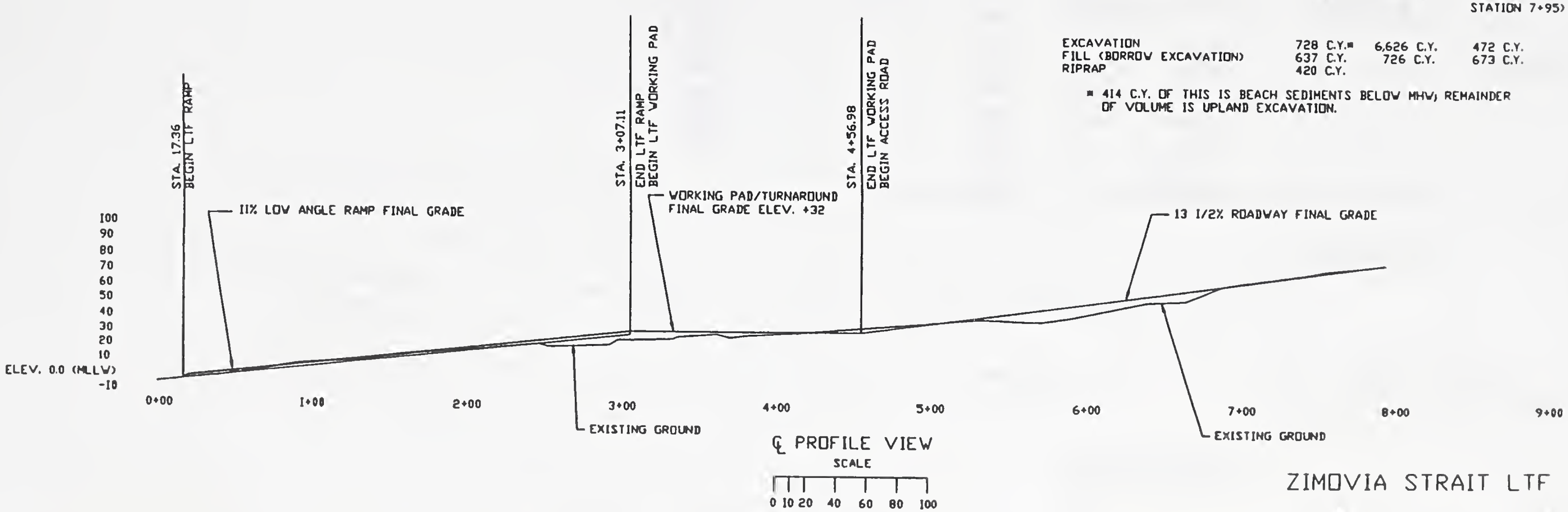


TYPICAL LTF WORKING PAD CROSS SECTION

QUANTITIES

	RAMP	LTF PAD	ROADWAY (TO STATION 7+95)
EXCAVATION	728 C.Y.*	6,626 C.Y.	472 C.Y.
FILL (BORROW EXCAVATION)	637 C.Y.	726 C.Y.	673 C.Y.
RIPRAP	420 C.Y.		

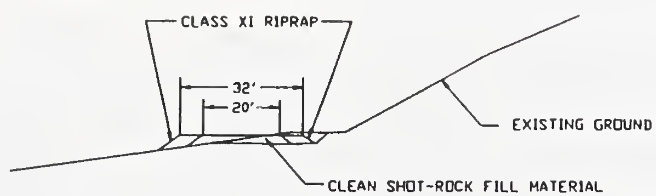
* 414 C.Y. OF THIS IS BEACH SEDIMENTS BELOW MHW; REMAINDER OF VOLUME IS UPLAND EXCAVATION.



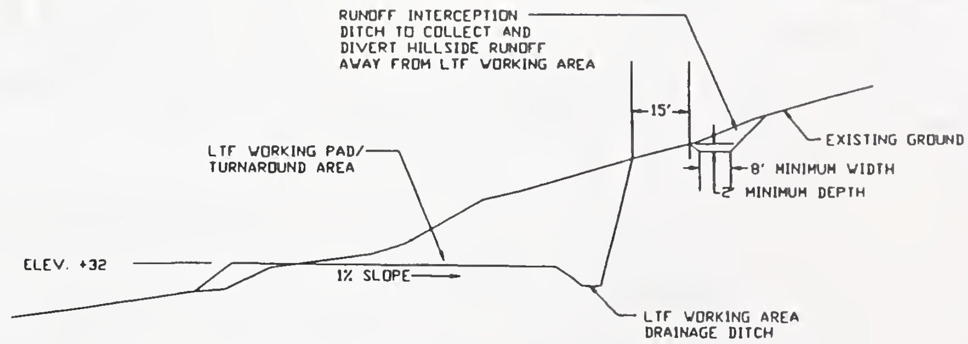
℄ PROFILE VIEW

ZIMOVIA STRAIT LTF

DRAWN BY: MC DATE: 10/17/95



TYPICAL RAMP CROSS SECTION



TYPICAL LTF WORKING PAD CROSS SECTION

QUANTITIES

	RAMP	LTF PAD	ROADWAY (TO STATION 7+95)
EXCAVATION	728 C.Y.*	6,626 C.Y.	472 C.Y.
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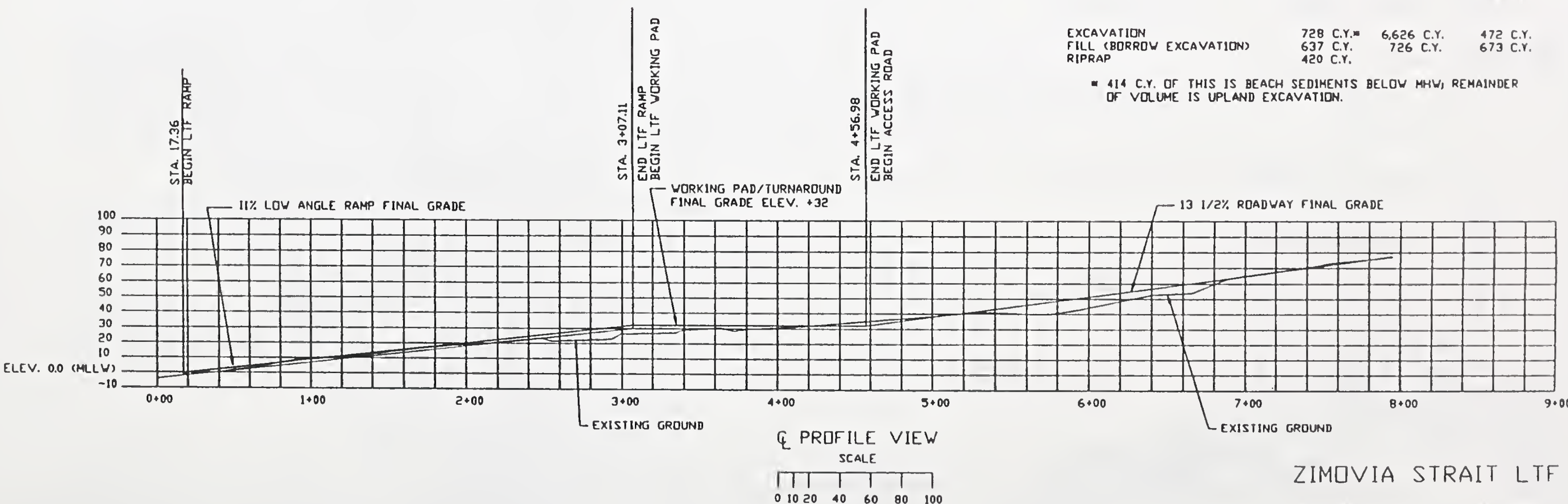

℄ PROFILE VIEW

ZIMOVIA STRAIT LTF

DRAWN BY: KHE DATE: 10/17/95

Appendix E

Comparison of King George DEIS with AFHA (Anadromous Fish Habitat Assessment) Recommendations

Appendix E

Comparison of King George DEIS with AFHA (Anadromous Fish Habitat Assessment) Recommendations

The January 1995 Forest Service Report to Congress, Anadromous Fish Habitat Assessment (AFHA) contained 14 recommended improvements to be considered for fish habitat protection. The Alaska Regional Forester directed us to implement these improvements in a memo dated August 25, 1995. Specifically, he stated that "these items...will only be accomplished to the extent they can be as part of other on-going work, without substantially disrupting or delaying project planning or implementation."

Because King George planning was well underway and most of the field inventory was completed by this date, we decided it would be useful to compare the King George DEIS with the recommendations. Some improvements are beyond the scope of individual projects such as King George. Specifically, the first four were assigned to the TLMP Revision Team for consideration during the forest plan revision. We have indicated the areas below where we have made progress on implementing the AFHA recommendations.

Increase protection of headwater areas, including steep slopes, high hazard soils, and Class III and smaller streams.

> Although we have not been required to proceed on increased protection, the King George DEIS does include increased protection of headwater areas through the use of partial retention harvest prescriptions, the use of helicopter yarding, and an emphasis on field verification of fish habitat and tributaries.

Modification of streamside buffers on floodplains and confined alluvial channels.

We have not been required to increase buffer width beyond that required by the Tongass Timber Reform Act. Nevertheless, most floodplain and alluvial streams adjacent to harvest units have greater than 100-foot no harvest buffers.

Clarification of the TLMP goal to "preserve biological productivity of [every] fish stream on the Tongass."

This item is beyond the scope of project level planning.

Establish quantitative objectives for fish habitat capability.

This item is beyond the scope of project level planning.

Increase monitoring on implementation and effectiveness of procedures for anadromous fish habitat protection.

This item is also beyond the scope of an individual project, but refer to the DEIS monitoring plan (Appendix C) for information about project monitoring.

Examine and improve Best Management Practices.

We have used the results of past BMP implementation monitoring to refine our application of BMPs in the King George study area. Specific actions include: increased protection of unstable slopes, increased protection of floodplains, increased emphasis on field verification of all streams in the project area, removal of windthrow-prone trees from unmanaged areas within units (particularly adjacent to v-notches), improved wetland identification and analysis, modification of sort yard and LTF location and design, thorough consideration of road management options (including road closures), and stream crossing locations and structure design to maintain channel stability and minimize failures.

Begin implementing watershed analysis.

This DEIS does not contain a Watershed Analysis at the scale of the pilot analyses conducted for the AFHA. However, the assessment of the freshwater system in Chapter 3 provides a thorough, watershed-based, holistic approach to timber sale planning that emphasizes the protection of aquatic habitat.

Ensure that management direction for habitat protection is consistently applied.

The Alaska Regional Forester issued a memo on November 21, 1995, which clarifies stream classification and application of statutory (TTRA) buffers. The buffer policy is consistent with policy previously implemented at the Wrangell Ranger District and does not affect King George buffers. The letter sets direction for a new stream classification as follows:

Class I and II streams: No change from existing policy.

Class III streams: Defined as "perennial and intermittent streams with no fish populations, but which have sufficient flow or transport sufficient sediment and debris to have an immediate influence on downstream water quality or fish habitat capability. These streams generally have bankfull widths greater than 5 feet and are highly incised into the surrounding hillslope."

Class IV streams: Defined as "other intermittent, ephemeral, and small perennial channels with insufficient flow or sediment transport capabilities to have an immediate influence on downstream water

quality or fish habitat capability. These streams are shallowly incised into the surrounding hillslope."

Non-streams: Defined as "rills and other watercourses, generally intermittent and less than 1 foot in bankfull width, little or no incisement into the surrounding hillslope, and with little or no evidence of scour."

The memo states that this classification "should be phased in...to the extent practicable and consistent with avoiding significant disruption or delay of the NEPA and project implementation processes." The memo also states that the addition of the Class IV streams and non-streams "should not change existing stream protection requirements contained in existing timber sale contract provisions and the BMP handbook."

Since King George planning was well underway at the time of this letter, and most of the stream verification was complete, it was not practical to re-classify the study area streams. Most headwater and tributary streams were classified according to current mapping protocols: all streams greater than 3 feet bankfull width which appeared to influence downstream water quality were classified as Class III streams. For this reason, it can be assumed that the DEIS includes most Class IV streams within units. The smaller, shallowly incised streams generally receive protection according to timber sale contract provision "c" (Appendix B).

Accelerate acquisition of research information.
This item is beyond the scope of project level planning.

Develop a Forest-wide restoration strategy for degraded watersheds.
This item is beyond the scope of project level planning.

Inventory anadromous fish habitats and communities.
Chapter 3 describes the King George Creek fish habitat inventory results.

Develop Forest-wide definitions, inventory standards, and interpretations of mass-movement-hazard areas and conduct full inventory and analysis of high-hazard and very high-hazard soils.
This item is beyond the scope of project level planning.

Classify streams draining intermittent and ephemeral channels.
Many of the mapped Class III streams in the King George study area are intermittent or ephemeral. Refer to the discussion of the Regional Forester's November 21, 1995, memo, above.

Further develop the process for setting quantitative objectives for fish habitat.
This item is beyond the scope of project level planning. However, our experience inventorying habitat in the King George drainage has contributed to the regional effort in setting quantitative objectives.

In summary, the planning effort on King George has made significant progress toward accomplishing the direction established as a result of the Anadromous Fish Habitat Assessment.

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USDA Forest Service
Stikine Area, Tongass NF
Wrangell Ranger District
P.O. Box 51
Wrangell, AK 99833